Proteomic Signatures of Cardiovascular Risk Factors: A Cross-sectional Analysis of the Plasma Proteome in the Framingham Heart Study

Laura Corlin, Boston Univ, Dept of Med, Boston, MA; Chunyu Liu, Martin G Larson, Boston Univ, Sch of Public Health, Boston, MA; Ramachandran S Vasan, Boston Univ, Dept of Med, Boston, MA

Introduction: Proteomic biomarkers related to cardiovascular disease (CVD) risk factors may offer insights into the pathogenesis of subclinical and clinical CVD.

Hypothesis: We hypothesized that 1) CVD risk factors may have distinctive proteomic signatures; and 2) select proteins are associated with multiple CVD risk factors indicating a central (pleiotropic) role in disease pathogenesis.

Methods: We measured 1317 circulating plasma proteomic biomarkers (SomaScan; using the SomaLogic platform) in up to 897 Framingham Heart Study Generation 3 participants (mean age 46 years; 56% women) without hypertension, diabetes mellitus, or clinical CVD at the second examination (2008-2011). We used linear regression (or logistic for binary outcomes) to relate levels of each inverse-log transformed proteomic biomarker to age, sex, body mass index (BMI), waist circumference, systolic and diastolic blood pressure, blood lipid fractions, fasting blood sugar and insulin, coronary artery calcium (by computed tomography), left ventricular mass (by echocardiography), pre-hypertension, pre-diabetes, dyslipidemia, overweight, obesity, alcohol consumption, physical activity (by accelerometer), and smoking. All models adjusted for age, sex, and BMI. A Bonferroni-adjusted p-value <2.7E-5 indicated statistical significance.

Results: Forty-one proteins were associated with ≥8 CVD risk factors and 13 proteins (Apo E, C5a, GHR, IGFBP-2, leptin, NG36, Notch-3, QORL1, RGMB, SHBG, TIG2, XTP3A, tPA) were associated with ≥10 risk factors. Illustrative volcano plots for proteomic signatures of smoking and physical activity show high representation of proteins related to tumor suppression, immunologic function, and cellular communication (Figure).

Conclusions: Our cross-sectional data from a relatively healthy community-based sample elucidated distinctive proteomic signatures of CVD risk factors. A small group of proteins were associated with multiple risk factors, suggesting their potential pleiotropic role in CVD.


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Introduction: DNA methylation age acceleration (DNAmAA) scores, which are epigenetic biomarkers of aging and physiological responses to environmental factors such as lifestyle and health behaviors, have been previously shown to be associated with cardiovascular disease (CVD) outcomes and all-cause mortality. Life's Simple 7 (LS7) is a tool promoted by the American Heart Association that summarizes individual adherence to seven key cardiovascular health and lifestyle metrics. We hypothesized that greater LS7 adherence would be associated with lower DNAmAA, consistent with slower biological aging.

Methods: Associations between DNAmAA and LS7 were estimated separately in 2,312 African American (AA) and 1,036 European American (EA) adult participants in the Atherosclerosis Risk in Communities (ARIC) study. Visit 1 (mean age = 53 yrs in AA adults, 56 yrs in EA adults) LS7 was calculated for each participant, with 0, 1, or 2 points assigned by adherence to each component: smoking status, body mass index, physical activity, diet, plasma cholesterol, blood pressure, and fasting glucose. The summed score was categorized as inadequate (0-4), intermediate (5-9), or ideal (10-14) LS7 status. Three different previously published DNAmAA scores (Horvath, Hannum, and PhenoAge), were calculated using data from the Illumina HM450K BeadChip on stored frozen leukocytes available at visit 2 or 3 (approximately 3-6 years later). Linear regression models tested the association of LS7 category with DNAm scores, adjusting for sex, chronological age, education, income, study center, alcohol use, white blood cell count, imputed WBC type proportions using the Houseman method, Illumina HumanExome Beadchip principal components for genetic ancestry, and Illumina HM450K control probe principal components for technical adjustment. The Bonferroni-corrected threshold for statistical significance across the six tests was set to p<0.0083 (0.05/6).

Results: Among AA adults, ideal LS7 status (compared to poor status) was associated with a 1 year lower PhenoAge acceleration (β=-1.03; 95%CI=-1.70, -0.35; p=0.003), but was not significantly associated with Horvath or Hannum DNAmAA scores. In EA adults, ideal LS7 adherence was not significantly associated with any of the three DNAmAA scores, but the direction and magnitude of the PhenoAge acceleration association in EA was similar to that in AA (β=-0.96; 95%CI=-2.66, 0.73; p=0.27).

Conclusions: African American adults with ideal LS7 status had lower PhenoAge acceleration than African Americans who did not, suggesting that heart-healthy lifestyles may slow biological aging processes in this population. Future studies should examine the prospective associations of changes in healthy lifestyle and changes in epigenetic biomarkers of aging as well as modifiers of this relationship.

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003

Metabolome-Wide Association Study With Habitual Physical Activity Among 4119 U.S. Participants

Ming Ding, Jessica Lasky-Su, Harvard Sch of Public Health, Boston, MA; Kathryn Rexrode, Harvard Medical Sch, Boston, MA; I-min Lee, Harvard Sch of Public Health, Boston, MA; Clary Clish, Broad Inst, Cambridge, MA; A Heather Eliassen, Walter Willett, Frank Hu, Peter Kraft, Harvard Sch of Public Health, Boston, MA

Background Being physically active has been associated with lower risks of cardiometabolic diseases. However, the biological mechanisms underlying these associations remain unclear, and can be investigated using a metabolomics approach. Objective To identify plasma metabolites associated with habitual physical activity in a U.S. population. METHODS Our study population included 4119 participants in the Nurses’ Health Study (NHS), NHS II, and Health Professionals Follow-up Study (HPFS). Physical activity was assessed periodically by self-reported questionnaire starting from 1984 in NHS, 1989 in NHSII, and 1986 in HPFS. We used physical activity measured closest before blood collection as exposure. Metabolic profiling was conducted by liquid chromatography-mass spectrometry (LC-MS). Our study included 287 known metabolites, with 64% of them classified as lipids (58 triglycerides [TAGs], 13 diglycerides [DAGs], 13 cholesteryl esters [CEs], 6 lysophosphatidylethanolamines [LPEs], 37 phosphocholines [PCs], 10 lysophosphatidylcholines [LPCs], 24 phosphatidylethanolamines [PEs], and 25 carnitines). We examined associations of physical activity with plasma metabolites using linear regression, and corrected for multiple testing using tail probability of the proportion of false positives (TPPFP) and accounting for correlated tests using bootstrapping. RESULTS Using linear model adjusting for age, case-control status, labcode, smoking status, fasting status, alcohol intake, and diet quality, physical activity was significantly associated with 27 metabolites after correcting for multiple testing (TPFP <0.05). Among the 27 identified metabolites, four CEs, eight PCs, and three LPCs were positively associated with physical activity, and five TAGs and four DAGs were inversely associated. After additionally adjusting for body mass index (BMI), the associations of physical activity with the majority of identified metabolites were attenuated; physical activity remained positively associated with three CEs (C18:2, C16:0, and C18:1), three PCs (C36:4 PC-A, C36:0 PC, C34:3 PC plasmalogen), and one LPC (C18:2). Enrichment analysis showed that physical activity was significantly positively associated with the CE category (P value for enrichment=0.048). Conclusions We identified seven metabolites that were significantly associated with physical activity after adjusting for BMI, which may help identify biomarkers of physical activity and provide insight into biological mechanisms underlying the beneficial effect of being physically active on cardiometabolic health.


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Novel Serum Metabolites Associate With Diastolic Function: Evidence From the Bogalusa Heart Study

Alexander C Razavi, Camilo Fernandez, Tulane University Sch of Med, New Orleans, LA; Xuenan Mi, Jiang He, Lydia Bazzano, Jovia Nierenberg, Shengxu Li, Tanika N Kelly, Tulane University Sch of Public Health and Tropical Med, New Orleans, LA

Introduction: Diastolic dysfunction is one key causal factor for heart failure with preserved ejection fraction (HFpEF). We conducted a metabolome-wide association study to identify novel diastolic function-related metabolites in relatively young and healthy adults.

Hypothesis: We hypothesized that serum metabolites could predict diastolic function and thus potentially serve as biomarkers for subclinical disease.

Methods: The study cohort consisted of 1,038 participants of the Bogalusa Heart Study (34.9% black, 57.3% females, aged 33.6-57.5 years). Diastolic function was assessed via 2D and tissue Doppler echocardiography, and included peak early filling velocity (E), peak velocity caused by atrial contraction (A), medial mitral annular velocity (e'), left ventricular isovolumic relaxation time (IVRT), as well as deceleration time (DT). Untargeted metabolomic analysis of fasting serum samples was conducted. Multivariable-adjusted linear regression models were employed to assess the relationship of metabolites with echocardiographic measures of diastolic function.

Results: Following quality control, 1202 metabolites were tested for association with E/A ratio, E/e' ratio, IVRT, and DT. After Bonferroni correction, 9 novel metabolites, derived from amino acid, cofactor, energy, lipid, and nucleotide pathways, were significantly associated with diastolic function in blacks with nominal significance and consistent effect direction in whites (Table). Of these significant metabolites, 2 and 6 metabolites were associated with the E/A ratio and E/e' ratio, respectively. No significant associations of metabolites with IVRT or DT were found. Fatty acid metabolism was the biological sub-pathway most represented in significant diastolic function-metabolite associations.

Conclusion: The current study identified novel metabolites associated with diastolic function, suggesting that the serum metabolome, and its underlying biological pathways, may be implicated in HFpEF pathogenesis.

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005

Childhood Risk Factors and Cardiovascular Disease Outcomes in Adulthood. Preliminary Findings From the International Childhood Cardiovascular Cohort (i3C) Consortium

Olli Raitakari, Univ of Turku, Turku, Finland; David R Jacobs Jr, Sch of Public Health, Univ of Minnesota, Minneapolis, MN; Jessica Woo, Cincinnati Children’s Hosp Medical Ctr, Cincinnati, OH; Elaine M Urbina, Univ of Cincinnati Coll of Med, Cincinnati, OH; Lydia Bazzano, Tulane Univ Sch of Public Health and Tropical Med, New Orleans, LA; Markus Juonala, Jorma Viikari, Univ of Turku, Turku, Finland; Wei Chen, Tulane Univ Sch of Public Health and Tropical Med, New Orleans, LA; Ronald Prineas, Wake Forest Univ, Winston-Salem, NC; Julia Steinberger, Univ of Minnesota, Minneapolis, MN; Stephen Daniels, Univ of Colorado Sch of Med, Aurora, CO; Alan Sinaiko, Univ of
Background: Atherosclerosis develops silently for decades before clinical cardiovascular disease (cCVD) occurs. Longitudinally, childhood risk factors predict adult pre-clinical atherosclerosis (carotid artery plaques, coronary artery calcification). There is currently no evidence directly linking childhood risk factors to cCVD. Methods: Using data from the i3C Consortium, consisting of five cohorts from the United States, one from Australia and one from Finland, we linked youth risk factors to adult cCVD. cCVD events were ascertained by re-contacting the participants in the US and Australia, then obtaining and medically adjudicating hospital records; and using the Finnish national health registry. Of 16,964 of these adult participants (mean age 49 years, range 24-67 years) who had been examined during ages 3-19 years, 201 people with any cCVD event (coronary artery, cerebrovascular, and peripheral artery disease, 70%, 25%, and 5% of events, respectively) have so far been ascertained. Analysis of deaths is in process. The associations between each youth risk variable and adult cCVD were examined in Cox proportional hazard models. Each model was additionally adjusted for childhood age, age at followup, sex and cohort/race. Continuous youth variables were z-scored for each participant’s last repeated measure during childhood. Results: Youth body mass index (BMI), serum total cholesterol (TC) and triglycerides, and systolic blood pressure were (all P <0.0001) positively associated with adult cCVD events. Regular smoking in youth was associated with a nearly 50% increased risk of adult cCVD (P=0.08). BMI and TC remained significant in the simultaneous risk factor model. The adjudication pipeline suggests that over 500 hospitalized cCVD events will be found when adjudication is complete. Regression using the full set of imputed events yielded similar findings. Conclusion: These international data find that exposure to CVD risk factors in youth predicts adult cCVD with implications for primordial CVD prevention.
**Introduction:** Atherosclerotic cardiovascular disease (ASCVD) remains the leading cause of morbidity in the U.S. We mapped ACC/AHA ASCVD risk in U.S. Veterans outpatients across U.S. geographic regions.

**Methods:** We computed 10-year ASCVD risk using the 2013 ACC/AHA risk calculator with risk factor values derived from electronic health records and compared the estimates to observed ASCVD rates within Veterans Health Administration (VHA) population. We mapped the standardized differences in the observed and predicted risk at the county level using ArcGIS software.

**Results:** There were 1.48 million VHA users between 2002-2007 aged 40 to 79 with median 10 years of follow-up. Mean age was 60 years, 96% were male, and 80% were white. The average 10-year predicted ASCVD risk after adjustment for true follow-up time at baseline was 13.8%, and the average observed risk was 6.6%, an overestimation of 7.2%. At baseline, 43.1% of patients were taking anti-hypertensive medications and 20.3% were taking statins. After updating risk factor statuses two years following baseline, 75.9% were taking anti-hypertensive medication, 42.6% were taking statins, and average predicted risk was dropped to 12.1%.

In sex- and race-specific analyses the 2013 ACC/AHA risk calculator over-estimated 10-year ASCVD risk in white female, non-white female, white male, and non-white male by 2.0%, 2.0%, 8.1% and 4.8%, respectively. The greatest over-predictions in 10-year ASCVD risks were observed in western Arizona, southern California, southern Florida and Pennsylvania. These regions had higher percentages of white male VHA users compared to national averages.

**Conclusion:** The 2013 ACC/AHA risk equation generally over-predicts ASCVD risk in the VHA population, particularly among white male Veterans. Increased anti-hypertensive and statin therapy with continual care at VHA was also associated with lower ASCVD risk. The mapping of these results allowed an overall visualization of the geographic variation across the U.S.


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007

**Actigraphy-Measured Sleep Regularity and Risk of Incident Cardiovascular Disease: The Multi-Ethnic Study of Atherosclerosis**

Tianyi Huang, Sara Mariani, Susan Redline, Brigham and Women’s Hosp, Boston, MA

**Background:** Prior studies have linked rotating night shift work to increased risk of cardiovascular disease (CVD). Irregular sleep schedules, characterized by high day-to-day variability in sleep duration or timing, represent possibly milder but much more
common/chronic disruption of circadian rhythms in the general population. However, no prospective study to date has examined the association between sleep regularity and CVD outcomes.

Methods: In the Multi-Ethnic Study of Atherosclerosis, 1,993 participants who were free of CVD completed 7-day wrist actigraphy at home for objective monitoring of sleep duration and quality between 2010 and 2013, and were prospectively followed through 2015. We assessed sleep regularity using the standard deviation (SD) of actigraphy-measured sleep duration and sleep onset timing across 7 days. Incident CVD was defined as total cardiovascular events including coronary heart disease, stroke, congestive heart failure, and cardiovascular death. Cox proportional hazards model was used to estimate hazard ratios (HR) and 95% confidence intervals (CI) for incident CVD according to SD of sleep duration and timing, adjusted for traditional CVD risk factors (e.g., sociodemographic factors, lifestyles and CVD biomarkers) and other sleep-related factors (e.g., average sleep duration, insomnia symptoms, daytime sleepiness, sleep-disordered breathing, chronotype and work schedules).

Results: During a median follow-up of 4.0 years, 95 participants developed CVD events. Compared to participants with a 7-day sleep duration SD ≤60 min, the multivariable-adjusted HR (95% CI) for CVD was 1.12 (0.61, 2.07) for 61-90 min, 1.71 (0.94, 3.09) for 91-120 min, and 2.20 (1.22, 3.96) for >120 min. Every 1-hour increase in sleep duration SD was associated with 23% higher CVD risk (95% CI: 1.05, 1.45; p-trend=0.01). In contrast to this linear association with sleep duration variability, there appeared to be a threshold pattern for the association with SD of sleep onset timing. Compared to participants with a sleep timing SD ≤30 min, the multivariable-adjusted HR (95% CI) for CVD was 1.13 (0.60, 2.13) for 31-60 min, 1.15 (0.58, 2.31) for 61-90 min, and 2.07 (1.09, 3.94) for >90 min. CVD risk was 87% higher comparing sleep timing SD >90 min versus ≤90 min (95% CI: 1.19, 2.96; p=0.007). These associations did not differ significantly by age, sex, race/ethnicity, sleep duration or work schedules. Exclusion of current shift workers yielded similar results.

Conclusion: Irregular sleep duration and timing may be novel risk factors for CVD, independent of traditional CVD risk factors and sleep quantity/quality. Given the increased prevalence of irregular sleep (e.g., due to mobile device use), our findings have important public health implications for CVD prevention and suggest value in evaluating the impact of sleep hygiene interventions aimed at improving sleep pattern consistency.

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008

Poor Lower Extremity Physical Function Increases Risk for Cardiovascular Disease Events in Older Women: The OPACH Study

John Bellettiere, UC San Diego, La Jolla, CA; Michael J. LaMonte, SUNY Buffalo, Buffalo, NY; Jonathan Unkart, UC San Diego, La Jolla, CA; Charles Kooperberg, Fred Hutchinson Cancer Res Ctr, Seattle, WA; Marcia L. Stefanick, Stanford Univ, Stanford, CA; Chongzhi Di, Fred Hutchinson Cancer Res Ctr, Seattle, WA; Andrea Z. LaCroix, UC San Diego, La Jolla, CA

Background: Good lower extremity physical functioning is paramount to healthy aging as it prevents social isolation, enables civic engagement, and facilitates physical activity. Strong evidence links physical functioning with all-cause mortality, but little is known about its relationship to cardiovascular disease (CVD).

Methods: Women (n=5043, mean age=79±7) with no history of myocardial infarction or stroke completed the Short Physical Performance Battery (SPPB) consisting of three
timed tasks to assess standing balance, strength (5 chair stands), and gait (4m walk). Results were summarized using prespecified cutpoints yielding a score from 0 (worst) to 12 (best). Women were followed for CVD events for up to 6 years. Hazard ratios (HR) were estimated for women with poor, low, moderate, and high functioning (respective SPPB ranges for each group: 0-3, 4-6, 7-9, and 10-12) using Cox proportional hazard models adjusted for several covariates including accelerometer-measured moderate to vigorous physical activity (MVPA) and sedentary behavior. Effect modification of associations between SPPB and CVD by age, MVPA, Reynolds Risk Score, race-ethnicity, and self-rated health were tested by including multiplicative interaction terms in fully adjusted Cox models with statistical significance for interactions set to 0.10.

**Results:** Covariate-adjusted HRs (95% CIs) for CVD [1.00 (ref.); 0.85 (0.62, 1.15); 0.69 (0.51, 0.93); 0.49 (0.35, 0.68)] and CVD mortality [1.00 (ref.); 0.72 (0.45, 1.15); 0.44 (0.27, 0.72); 0.35 (0.19, 0.62)] decreased across poor, low, moderate, and high SPPB subgroups, respectively (p-trend<.001 | both). Associations were significantly stronger only among women with low Reynolds Risk Scores and among women in good/fair/poor health (Table).

**Conclusions:** SPPB was inversely and dose-dependently related to risk of CVD and CVD mortality. SPPB is an integrated physiologic measure of lower extremity physical function that is critical to aging well, potentially to include CVD prevention in later life.

### Table 3: Associations of physical functioning (comparing the 75th percentile to the 25th percentile [Q3=Q1] of the Short Physical Performance Battery score) with incident cardiovascular disease (CVD) events and CVD mortality, by selected participant characteristics; OPACH (2012-2016)

<table>
<thead>
<tr>
<th>Total Sample</th>
<th>Incident CVD events* (No. events = 624)</th>
<th>P-interaction</th>
<th>CVD Mortality (No. events = 107)</th>
<th>P-interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 80 Years</td>
<td>0.69 (0.57-0.83)</td>
<td>0.12</td>
<td>0.66 (0.55-0.79)</td>
<td>0.92</td>
</tr>
<tr>
<td>≥ 80 Years</td>
<td>0.83 (0.74-0.93)</td>
<td></td>
<td>0.69 (0.57-0.85)</td>
<td></td>
</tr>
<tr>
<td>Reynolds Risk Score</td>
<td>0.06</td>
<td></td>
<td>0.62 (0.59-0.65)</td>
<td></td>
</tr>
<tr>
<td>&lt; 9.7</td>
<td></td>
<td></td>
<td>0.66 (0.52-0.83)</td>
<td></td>
</tr>
<tr>
<td>≥ 9.7</td>
<td></td>
<td></td>
<td>0.64 (0.60-0.72)</td>
<td></td>
</tr>
<tr>
<td>Self-rated health</td>
<td>0.32</td>
<td></td>
<td>0.21 (0.17-0.25)</td>
<td></td>
</tr>
<tr>
<td>Excellent or very good</td>
<td>0.90 (0.77-1.06)</td>
<td></td>
<td>0.82 (0.65-1.02)</td>
<td></td>
</tr>
<tr>
<td>Good, fair, or poor</td>
<td>0.82 (0.68-0.98)</td>
<td></td>
<td>0.62 (0.48-0.77)</td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: HR = hazard ratio; CI = confidence interval; BMI = body mass index; MVPA = moderate-to-vigorous physical activity.

* CVD events were adjudicated by study physicians and included myocardial infarction, revascularisation, heart failure, hospitalized angina (not adjudicated), stroke, cerebrovascular disease, and CVD-death.

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009

**Comparative Associations of Peripheral Artery Disease vs. Prevalent Myocardial Infarction or Stroke with Subsequent Mortality in the US Population, NHANES 1999-2004**

Kunihiro Matsushita, Lucia Kwak, Shoshana H. Ballew, Maya Salameh, Johns Hopkins Univ, Baltimore, MD; Matthew Allison, Univ of California San Diego, San Diego, CA; Elizabeth Selvin, Josef Coresh, Johns Hopkins Univ, Baltimore, MD

**Background:** The FOURIER trial of a PCSK9 inhibitor in patients with prevalent cardiovascular disease reported that patients with peripheral artery disease (PAD) without myocardial infarction (MI) or stroke (MI/stroke) had worse prognosis than those with MI/stroke without PAD. However, whether this observation holds in the general population is unknown. **Methods:** We conducted a prospective analysis of 5,858 participants aged 40 years or older from the 1999-2004 National
Health and Nutrition Examination Survey and compared overall mortality among four categories by PAD (ankle-brachial index ≤0.9) and MI/stroke (self-report) status at baseline using Kaplan-Meier curves and multivariable Cox models adjusted for potential confounders such as age, sex, race, diabetes, smoking, blood pressure, and lipids. **Results:** There were 125 participants (2.1%) with both PAD and MI/stroke, 323 (5.5%) with PAD without MI/stroke, and 571 (9.7%) with MI/stroke without PAD (4,785 participants without MI/stroke or PAD). During a median follow-up of 9.5 years, 1,133 participants died. Compared to those without PAD or MI/stroke, participants with both MI/stroke and PAD had the worst survival (36.8% at 10 years), followed by those with PAD without MI/stroke (56.4%) and then those with MI/stroke without PAD (71.0%) (Figure). Multivariable Cox models showed similar patterns: adjusted hazard ratios of 2.81 [95% CI 2.16-3.66] in MI/stroke with PAD, 1.85 (1.41-2.43) in PAD without MI/stroke, and 1.59 [1.30-1.95] in MI/stroke without PAD. **Conclusions:** In the general population, the presence of PAD contributed to significantly higher mortality in those with and without MI/stroke. PAD without MI/stroke showed similar or even worse prognosis than MI/stroke without PAD. These results suggest the importance of recognizing the presence of PAD in the community.

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**010**

**Heart Disease and Arrhythmia in a Sample Experiencing Homelessness: Epidemiology, Prior History and Risk Factors**

**Ben King**, UT Dell Medical Sch, Houston, TX

Background: Adults experiencing homelessness experience 40-50% greater mortality risk from heart disease than the general population. Research has identified several risk factors, including poor glycemic, hypertension, and hyperlipidemia control, high prevalence of cigarette smoking, and elevated homocysteine levels from smoking and poor nutrition. Implemented in 2014, the Vulnerability Index - Service Prioritization Decision Assistance Tool (VI-SPDAT v1) is a 50 question survey intended to prescribe appropriate levels of intervention, and prioritize the waiting list for housing services. Method: The VI-SPDAT was used to assess a cohort of individuals experiencing homelessness (n=4,739 unique participants) seeking subsidized housing services in a single county in Texas. The results of the self-report survey’s medical questions were validated through linkage to the community’s Health Information Exchange (HIE) for indigent populations. Confirmatory Factor Analysis tests were performed on all first-time assessments, and modification indices were used to optimize a 5 factor model of global vulnerability in the homeless population. Logistic regression was used to identify independent covariates associated with reported heart disease within various sections (explicit domains) within the measure. Results: One quarter of all individuals assessed with the VI-SPDAT reported a history of heart disease or arrhythmia (24.98%). Criterion validation of the tool using HIE data
supported that this prevalence estimate was possibly even under-reported, with diagnostic data available for 3,240 participants and a 38.67% prevalence of heart disease or arrhythmia (26.44%, adjusted for full sample). Rates of the condition were elevated for females (27.5% vs 24.0%), non-Hispanic participants (25.7% vs 21.7%), and those experiencing chronic homelessness (HUD definition; 26.8% vs 22.5%). Behavioral and cognitive health conditions associated with heart disease included problems with concentration, history of traumatic brain injury, ED visits for mental health symptom management, and poor medication adherence (all p<0.001). Social risk factors such as being the victim of an attack, associating with perceived bad influences, having people they don't like in their lives, and being forced or tricked into doing things by others were all associated with heart disease (all p<0.001).

Discussion: This research presents a rare window into the complex interrelationships of social and medical vulnerability that surround cardiovascular diseases in a sample of extremely vulnerable individuals. Analytical techniques applied to this data show several relationships not previously explored in the literature, and support the existing evidence of heightened cardiovascular risk due to multiple exposures more common in those experiencing homelessness.

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011

Comprehensive Cardiovascular Risk Reduction Trial in Persons With Serious Mental Illness (IDEAL Trial)

Gail L. Daumit, Lawrence Appel, Nae-Yuh Wang, Johns Hopkins Univ Sch of Med, Baltimore, MD

Introduction: Persons with serious mental illness (SMI) are at high risk for cardiovascular disease (CVD), with CVD mortality with rates at least twice those of the overall US. Potentially modifiable CV risk behaviors (tobacco smoking, obesity, physical inactivity, unhealthy diet) and risk factors (hypertension, diabetes, dyslipidemia) are all markedly elevated in persons with SMI. This vulnerable population often has substantial challenges related to cognitive impairment and psychiatric symptoms in addition to high prevalence of substance use, low income and social isolation. Accomplishing meaningful reductions in CVD risk for persons with SMI will require special efforts to develop interventions to promote CV health in this high-risk group. Our objective was to determine the effectiveness of an 18-month comprehensive CVD risk reduction intervention in adults with SMI.

Hypothesis: The active intervention is more effective than the control condition in reducing CVD risk as assessed by the global Framingham Risk Score (FRS).

Methods: We conducted a NHLBI-sponsored RCT in 269 adults with SMI who had at least one of the following CV risk behaviors/ factors: BMI≥25 kg/m², tobacco smoking, hypertension, diabetes, or dyslipidemia. Participants were recruited from four locations of an outpatient community mental health organization. Those in the active intervention received an 18-month individual-level intervention delivered by a health coach and a nurse providing 1) tailored CVD risk reduction counseling; 2) collaboration with physicians to implement appropriate management of CVD health risks; and 3) coordination with mental health staff and social supports to encourage and motivate attainment of individual CV health goals. We also provided training and resources to promote group physical activity classes, and a dietician to consult with kitchen staff to provide healthier meals (accessible to all mental health program attendees).

Results: At baseline, mean(SD) age was 48.8(11.9) years, range 21-71. Of 269, 48% (N=128) were male, 46% (125) were African-
American, 84%(226) received disability, 59%(159) had schizophrenia/schizoaffective disorder, 25%(67) had bipolar disorder, and 14%(38) had depression. BMI was 33.7(7.2) kg/m$^2$; 51% (138) smoked tobacco, 52% (141) had hypertension, 35% (93) had diabetes, 65%(175) had dyslipidemia. Mean(SD) baseline global FRS was 12.1(12.1)% overall, 16.9(14.6)% for men, 7.9(6.8)% for women. By October 15, 2018, 94%(253 of 269) participants completed the trial and had 18-month data collected. Eighteen-month data collection for the trial will conclude in November, 2018.

Conclusion: Unless effective interventions that effect CV health outcomes are implemented, populations with SMI will continue to lag far behind the nation’s CVD goals. The IDEAL intervention is well positioned to address all CV risks in persons with SMI.

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012

Performance of Polygenic Risk Scores for Coronary Artery Disease in the Million Veteran Program

Catherine Tcheandjieu, Xiang Zhu, Shining Ma, Stanford Univ Sch of Med, Stanford, CA; Austin Hilliard, Palo Alto Veterans Inst for Res, Palo Alto, CA; Shoa L Clarke, Stanford Univ Sch of Med, Stanford, CA; Julie A Lynch, VA Salt Lake City Healthcare System, Salt Lake City, UT; Scott M Damrauer, Univ of Pennsylvania, Philadelphia, PA; Amit V Khera, Sekar Kathiresan, Massachusetts General Hosp, Boston, MA; Philip S Tsao, Palo Alto VA Healthcare System, Palo Alto, CA; J. Michael Gaziano, VA Boston Healthcare System, Boston, MA; Peter W Wilson, Atlanta VA Medical Ctr, Atlanta, GA; Christopher O’Donnell, VA Boston Healthcare System, Boston, MA; Themistocles L Assimes, Stanford Univ Sch of Med, Stanford, CA; on behalf of the VA Million Veteran Program

Introduction: Recent studies suggest a substantial improvement in risk prediction of coronary artery disease (CAD) with polygenic risk scores (PRS). The degree to which this improvement is generalizable to other European (EUR) and non-EUR populations remains unclear. Hypothesis: We hypothesized that genome-wide PRSs trained and validated in the UK Biobank (UKBB) would perform best in external EUR populations and reduce the performance gap in prediction between EURs and African Americans (AA). Methods: We tested our hypothesis in ~91 000 EUR, AA, and Hispanic (HISP) Million Veteran Program (MVP) participants with CAD and ~225 000 non-cases as of July 2017. We created 5 separate weighted PRSs in all participants using: 1) 164 genome-wide significant SNPs for CAD (164SNPs), 2) 46 000 Metabochip SNPs (GRS46K), 3) 1.5 million (M) SNPs from standard pruning & thresholding of CARDIOGRAM+C4D (Khera_P&T), 4) 6.6M SNPs PRS created with LDpred (LDpred_Khera), and 5) 1.7M SNP PRS combining weights of 3 PRSs through meta-analysis (meta-GRS). We estimated age & sex adjusted Odds Ratios (OR) of CAD per standard deviation increase in each PRS using logistic regression and performed sensitivity analyses in subgroups of cases and non-cases. Results: LDpred and meta-GRS performed best among EURs (figure). However, the point estimate of the OR for these PRSs in MVP was notably lower than that observed in the UKBB (1.36 vs. ~1.7). ORs in MVP were higher among participants with early-onset disease (1.39), myocardial infarction (1.52), and revascularization (1.56) but lower for incident events after enrollment (1.27). Performance in HISP was mildly diluted but all PRS performed poorly among AA (figure).
Conclusion: Genome-wide PRSs developed in the UKBB transfer best to external EUR populations but may over-estimate risk and do not close the performance gap in prediction between EURs and AAs. Our findings highlight a need for better calibrated PRSs specific to the cohort and race/ethnic group being tested prior to implementation in clinical practice.


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013

Cumulative Socioeconomic Disadvantage Across Life Course and Risk of Hospitalization for Heart Failure or Atrial Fibrillation and Mediating Pathways: Prospective Findings From the Moli-Sani Study

Marialaura Bonaccio, Augusto Di Castelnuovo, Simona Costanzo, Amalia De Curtis, Mariarosaria Persichillo, Chiara Cerletti, Maria Benedetta Donati, Giovanni de Gaetano, Licia Iacoviello, IRCCS NEUROMED, Pozzilli, Italy; Moli-Sani Study Investigators
Introduction: The indications and risks associated with carotid endarterectomy (CEA) are well established. We sought to investigate sex and race-based disparities in the incidence of CEA after adjusting for carotid artery stenosis risk factors.

Methods: We conducted a prospective cohort analysis of 14,754 black and white participants in the Atherosclerosis Risk in Communities (ARIC) study who did not have a diagnosis of carotid artery stenosis at baseline (1987-1989). We estimated the cumulative incidence of CEA by sex and race using the Kaplan-Meier method. We used Cox proportional hazards models with adjustment for sociodemographic, cardiovascular, and disease severity risk factors to quantify the association with the incidence of CEA. Cardiovascular risk factors (hypertension, coronary heart disease, chronic kidney disease, diabetes), carotid intima media thickness(IMT), and symptomatic status (stroke or symptomatic carotid artery stenosis based on hospital diagnosis codes) were adjusted as time-varying exposures.

Results: CEA was performed in 345 of 14,754 ARIC participants over a median of 27 years follow-up [incidence rate 1.04 (95%CI 0.93-1.15) per 1,000 persons-years]. The crude incidence of CEA varied significantly by sex [female vs. male: HR 0.58 (95%CI 0.47-0.72)] and race [black vs. white: HR 0.63 (95%CI 0.48-0.84)]. Adjustment for sociodemographic and cardiovascular risk factors, carotid IMT, and symptomatic status attenuated the association of sex with CEA [females vs. males HR 0.82 (95%CI 0.65-1.03)], but black participants had a persistently lower risk of incident CEA despite adjustment [HR 0.64 (95%CI 0.45-0.89)](Figure). Conclusions While there are known sex and race-based differences in the prevalence of carotid artery stenosis, we found significant variation in the incidence of CEA based on race that is independent of traditional risk factors and carotid IMT. Whether this disparity is a reflection of differences in disease presentation or access to care deserves investigation.
Better Neighborhood Characteristics Are Associated with Ideal Cardiovascular Health Among Blacks: Results From the Morehouse-Emory Cardiovascular (MECA) Center for Health Equity

**Introduction:** Intra-racial heterogeneity in cardiovascular health (CVH) among Blacks is understudied, and more research is needed to identify factors promoting CVH among Blacks. Neighborhood environment is increasingly recognized as an important determinant of CV risk and health. Yet whether specific features of neighborhood physical and social environments may promote CV resilience among Blacks has been underexplored.

**Hypothesis:** Better neighborhood characteristics are associated with ideal CVH among Black adults, measured as Life’s Simple 7 (LS7) scores.

**Methods:** We recruited 392 Black adults (age 53 ± 10, 39% male) without known CV disease in Atlanta, GA, who resided in 199 residential neighborhood (defined as census tracts). Seven neighborhood domains were assessed via questionnaire: aesthetic quality, walking environment, safety, food access, social cohesion, activity with neighbors, and violence. CVH was determined by LS7 scores calculated from measured blood pressure, glucose, cholesterol, body mass index (BMI), and self-reported exercise, diet, and smoking, and categorized into poor (0-8), intermediate (9-10), and ideal (11-14). Multinomial logistic regression was used to examine the association between neighborhood characteristics and the odds of intermediate/ideal CVH categories compared to poor CVH after adjustment for age, gender, household income, education, marital status, and employment status.

**Results:** A total of 53 (14%), 110 (28%), and 229 (58%) participants had ideal, intermediate, and poor LS7 scores, respectively. Better scores in the neighborhood domains of social cohesion and activity with neighbors were significantly associated with higher adjusted odds of ideal LS7 scores (OR 1.95, 95% CI [1.32 - 2.90] and 1.65 [1.16 - 2.35] per 1 standard deviation [SD] increase in respective scores). Specifically, better scores in social cohesion were associated with higher odds of ideal CVH in exercise (OR 1.73 [1.16 - 2.59]), diet (OR 1.99 [1.14 - 3.48]), and BMI (OR 1.51 [1.09 - 2.09]); better scores in activity with neighbors were also similarly associated with higher odds of ideal CVH in exercise (OR 1.47 [0.99 - 2.19]), diet (OR 2.37 [1.32 - 4.26]), and BMI (OR 1.44 [1.05 - 1.96]; per 1 SD in respective scores). Aesthetic quality,
walking environment, safety, food access, and violence were not significantly associated with overall CVH categories in the adjusted models. **Conclusion:** More desirable neighborhood characteristics, particularly social cohesion and activity with neighbors, were associated with better CVH among Black adults. Further research is needed to investigate whether interventions to improve neighborhood qualities lead to better CVH in Blacks.


Funding: Yes

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**Lower Levels of County Housing Affordability Are Linked to Worse Cardiometabolic Risk Profiles in Middle-Aged and Older Adults**

Justin Rodgers, Northeastern Univ Bouvé Coll of Health Sciences, Boston, MA; Robert B. Wallace, Univ of Iowa Coll of Public Health, Iowa City, IA; Becky A. Briesacher, Northeastern Univ Bouvé Coll of Health Sciences, Boston, MA; Christopher F. Baum, Boston Coll, Boston, MA; Ichiro Kawachi, Harvard Sch of Public Health, Boston, MA; Daniel Kim, Northeastern Univ Bouvé Coll of Health Sciences, Boston, MA

INTRODUCTION: Housing is a fundamental social determinant of health. Past studies have shown that high levels of unaffordable housing raise residents’ chances of moving, often redistributing individuals into socioeconomically disadvantaged neighborhoods and dwellings. This may simultaneously expose individuals to health-detrimental factors while limiting their exposure to health-promoting factors. Residents within unaffordable housing areas may also experience adverse physical and mental health outcomes through various psychosocial, behavioral and material pathways. Yet few studies have examined the relationship between housing affordability and risk factors for cardiovascular disease, the leading cause of morbidity and mortality among Americans.

**HYPOTHESIS:** We investigated the hypothesis that lower levels of county housing affordability are linked to higher odds of incident hypertension, diabetes, obesity, and depression.

**METHODS:** Using a nationally-representative sample of 3,722 middle-aged to older adults from the National Longitudinal Survey of Youths 1979 and exploiting quasi-experimental variation before and after the Great Recession, we estimated the associations between the change in median county-level percentage of household income spent on housing (rent, mortgage) between 2000 and 2008 and individual-level odds of incident hypertension, obesity, diabetes, and depression during the follow-up period 2008-2014. Incidence of hypertension and diabetes was assessed through survey-reported physician diagnosis. Obesity was defined as a BMI $\geq 30$ kg/m$^2$, and depression was measured using the 7-item Center for Epidemiologic Studies Depression Scale and designated based on a cut-off score of 7. We employed fixed effects logistic regression models to reduce bias due to time-invariant confounding.

**RESULTS:** Each percentage point increase in the median county-level percentage of household income spent on rent or mortgage was associated with a 17% increase in the odds (OR = 1.17, 95% CI = 1.00 to 1.39; $p = 0.047$) of incident hypertension, a 37% increase in the odds (OR = 1.37, 95% CI = 1.00 to 1.87; $p = 0.049$) of obesity, and a 15% increased odds (OR = 1.15, 95% CI = 1.01 to 1.31; $p = 0.030$) of depression, controlling for individual- and area-level demographic and socioeconomic factors. No association was observed for diabetes.
These associations were stronger among renters than among homeowners, and in men compared to women. In sensitivity analyses, these findings were robust when we limited the sample to non-movers and when we used alternative depression score cut-points.

CONCLUSIONS: Our findings suggest that lower levels of housing affordability contribute to worse risk profiles for cardiovascular disease. Policies that make housing more affordable may help to reduce the population burden of cardiovascular disease.


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017

Impact of Gentrification on Cardiovascular Disease Surveillance Using Data from the Electronic Health Record


Introduction: Current static approaches of CVD surveillance may not capture the true health of neighborhoods as the influx of younger, healthier, and wealthier individuals (i.e., gentrification) can impact long term residents (LTR) who can be older and of lower socioeconomic status (SES), potentially biasing prevalence estimates.

Hypothesis: LTR in gentrifying vs. LTR in non-gentrifying neighborhoods will have a lower prevalence of CVD related conditions.

Methods: We quantified the census tract prevalence of diabetes (DM), hypertension (HTN), obesity, and CVD (myocardial infarction or stroke hospitalization) using electronic health record (EHR) data from the Duke Health System and Lincoln Community Health Center from 2008-2010 and 2014-2016. The EHR population was 116,760 patients living in Durham County in 2008 followed until 12/31/16. LTR were patients with the same 2010 and 2015 address; patients moving in/out (i.e., movers) did not have a recorded address in 2010 or 2015. A census tract was defined as gentrifying if 3 of 4 SES indicators (positive z-score for median household income, median rental price, % with bachelor’s degree, or a negative z-score for % living below the poverty line) improved. In difference-in-difference (DiD) analysis, we compared changes in prevalence of CVD health indicators between LTR in gentrifying and non-gentrifying neighborhoods.

Results: At baseline, patients had a median age of 43 years, 42% were black and 61% were female. The overall prevalence of DM, HTN, obesity, and CVD was 12%, 32%, 19%, and 5% in 2010 & 14%, 31%, 32%, and 7% in 2016. The prevalence increased in gentrifying and non-gentrifying neighborhoods over time and was higher in LTR than comparable movers. Estimates from DiD models were not statistically significant (Figure 1).

Conclusions: LTR vs. movers and not gentrification impacted the surveillance of CVD health indicators. Novel public health informatics methods are needed to address dynamic changes in neighborhoods that may bias the enumeration of CVD health indicators.

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New York City Youth Cardiovascular Fitness and Subsequent School Absenteeism Have an Inverse, Dose-Response Relationship, Regardless of How Poverty is Measured

Emily M. D’Agostino, Miami-Dade County Dept of Parks, Recreation and Open Spaces, Miami, FL; Sophia E. Day, Kevin J. Konty, NYC Dept of Health and Mental Hygiene, Office of Sch Health, New York, NY; Katarzyna Wyka, CUNY Graduate Sch of Public Health and Health Policy, New York, NY

Introduction: Recent research demonstrates that cardiovascular fitness improvements are associated with lower absenteeism, particularly for girls attending schools located in high poverty neighborhoods. Poverty at the student, school, and neighborhood levels may each have unique effects on both cardiovascular fitness and school absenteeism. There is a need to simultaneously explore the effects of poverty measures collected at different levels of observation on the longitudinal fitness-absenteeism relationship and across gender in order to inform policy targeting reduced school absenteeism.

Hypothesis: It was hypothesized that poverty measured at the neighborhood level would have the strongest magnitude of effects on the cardiovascular fitness-absenteeism relationship compared with poverty measured at the school and student levels.

Methods: Data for this study were drawn from the New York City Fitnessgram dataset. Inclusion criteria were enrollment in a New York City public school for at least 2 consecutive years in grades 6-8 (2006-2013) while attending a school that collected Fitnessgram measurements. Negative binomial longitudinal mixed models with random-intercepts were run to test the association between the exposure, child-specific change in cardiovascular fitness from the year prior, and the outcome, days absent the subsequent year. Separate crude and adjusted models were run stratified by student (individual household), school (percent of students living in poverty or qualifying for free/reduced price school meals) and neighborhood (home- and school-area) poverty measures, and also by gender. Models were adjusted for individual- and group-level confounders (time, grade, race/ethnicity, place of birth, change in obesity status, and school size), and clustering by individual student and school.

Results: The sample included 360,743 students (67% black or Hispanic, 51% male, 69% qualifying for free/reduced price school meals). Adjusted estimates showed an inverse-dose response fitness-absenteeism relationship across all poverty measures, with the highest magnitude of effects for youth attending schools in high poverty neighborhoods (IRR = -0.12, 95%CI: -0.20, -0.04 in girls; IRR = -0.13, 95%CI: -0.29, .03 in boys), and in girls attending schools with a high proportion of students qualifying for free/reduced school meals (IRR = -0.11, 95%CI: -0.23, -.01).

Conclusions: In conclusion, there is an inverse, dose-response trend between cardiovascular fitness and subsequent absenteeism in high poverty youth, regardless of how poverty is measured, and particularly among girls. Future research should examine the potential for distinct youth physical activity interventions tailored to the individual, school and neighborhood levels to reduce school absenteeism associated with poverty.


Funding: No

Funding Component:
Changes in Gut Microbial Metabolites and Risk of Coronary Heart Disease in US Women: the Nurses’ Health Study


Introduction: Circulating levels of gut microbial metabolites, trimethylamine N-oxide (TMAO) and its nutrient precursors of choline and L-carnitine, have been suggested as risk factors for coronary heart disease (CHD). Whether changes in gut microbial metabolites are associated with the CHD incidence remains unknown.

Hypothesis: We assessed the hypothesis that long-term (over 10 years) changes in plasma levels of TMAO, choline, and L-carnitine would be associated with the risk of CHD.

Methods: This prospective nested case-control study included a total of 768 women (385 incident cases of fatal CHD and nonfatal myocardial infarction and 383 controls) who had data on blood concentrations of TMAO, choline, and L-carnitine at 2 time points, 10 years apart (1989-90, and 2000-01). We identified incident cases of CHD from the date of the second blood collection through 2014.

Results: Higher TMAO levels at the second collection were associated with higher risk of CHD (relative risk (RR) 1.22 [95% CI: 1.05, 1.42] per 1 SD increment in log-transformed TMAO) in multivariate analyses controlling for traditional risk factors. Compared with women with low TMAO levels (lower two tertiles) at both time points, the RR was 1.74 (95% CI: 1.05, 2.89) for those with elevated levels of TMAO (the highest tertile) at both time points. Regardless of metabolite levels at the first collection, increases in TMAO or L-carnitine from the first to second collections were significantly associated with an increased risk of CHD (Fig. panels A-B). Women who had increases in both TMAO and L-carnitine had a particularly elevated risk of CHD (RR 2.12, 95% CI: 1.25, 3.59), as compared to those with decreases in both metabolites. Adherence to healthy dietary habits attenuated the associations of TMAO with CHD risk (Fig. panel C).

Conclusions: Long-term increases in TMAO were significantly predictive of subsequent risk for CHD among women. The associations may be modified by the nutrient metabolite precursor, L-carnitine, and adherence to healthy dietary habits.


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Funding Component:
Age-Associated Rise in Arterial Stiffness Among Hunter-Gatherers

Mingyu Zhang, Dept of Epidemiology, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Oscar Noya-Alarcon, Amazonic Ctr for Res and Control of Tropical Diseases, Puerto Ayacucho; Insto de Medicina Tropical, Univ Central de Venezuela, Caracas, Venezuela, Bolivarian Republic of; Monica Contreras, Venezuelan Inst for Scientific Res, Caracas, Venezuela, Bolivarian Republic of; Hirofumi Tanaka, The Univ of Texas at Austin, Austin, TX; Kunihiro Matsushita, Lawrence J Appel, Dept of Epidemiology, Johns Hopkins Bloomberg Sch of Public Health; Welch Ctr for Prevention, Epidemiology, and Clinical Res, Johns Hopkins Univ, Baltimore, MD; Maria G Dominguez-Bello, Rutgers Univ, New Brunswick, NJ; Noel T Mueller, Dept of Epidemiology, Johns Hopkins Bloomberg Sch of Public Health; Welch Ctr for Prevention, Epidemiology, and Clinical Res, Johns Hopkins Univ, Baltimore, MD

Introduction: Elevated blood pressure (BP) and arterial stiffness increase cardiovascular disease risk. While BP and arterial stiffness both increase with age in most westernized populations, BP does not rise with age in isolated hunter-gatherers, including Yanomami, where vascular disease is uncommon. No studies have examined if arterial stiffness rises with age among Yanomami or the geographically collocated Yekwana.

Methods: In a pilot study conducted in February 2016, we sampled participants from 5 isolated Yanomami-Sanema villages and 3 Yekwana villages in the Upper Caura River Basin, a remote area of the Venezuelan Amazon. Trained staff measured cardio-Ankle vascular index (CAVI) per standard protocols, and height and weight to determine body mass index (BMI). We used ANCOVA to compare the age-CAVI association between Yanomami and Yekwana, and further compared associations with data from US whites and Japanese female volunteers for physiological studies with CAVI measurement. Results: 80 participants (63 Yekwana; 17 Yanomami) age 11-72 years had data on CAVI. A 5-year increment in age was associated with a 0.24 unit (95% CI: 0.17, 0.31) and a 0.25 unit (95% CI: 0.14, 0.35) increase in CAVI in Yekwana and Yanomami, respectively (Figure). The age-CAVI slope did not differ in these two populations (p=0.95). Compared to Yanomami and Yekwana individuals, a 5-year increment in age was associated with a significantly greater increase in CAVI in US whites (0.12, 95% CI: 0.04, 0.20) and a non-significantly greater increase in Japanese females (0.08, 95% CI: -0.02, 0.18). Estimates did not markedly change after adjusting for BMI. Conclusion: In Yekwana and Yanomami individuals with hunter-gatherer lifestyles, arterial stiffness increased with age, in a manner similar to Japanese females but less steep than US whites. Taken together with our previous finding that BP does not rise with age in Yanomami and minimally in Yekwana, our preliminary findings suggest that rise in arterial stiffness with age might be independent of BP.


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022
Exploring the 24 Hour Day: using Isotemporal Substitution to Model the Cardiometabolic Benefits of Sleep Duration in Older Women

Kelsie M Full, Univ of Minnesota, Minneapolis, MN; Jacqueline Kerr, Atul Malhotra, Univ of California San Diego, La Jolla, CA; Linda Gallo, San Diego State Univ, San Diego, CA; John Bellettiere, Univ of California San Diego, La Jolla, CA; Elva Arredondo, San Diego State Univ, San Diego, CA; Katie L Stone, Univ of California San Francisco, San Francisco, CA; Oleg Zaslavsky, Univ of Washington, Seattle, WA; Cora E Lewis, Univ of Alabama at Birmingham, Birmingham, AL; Xiao Chen Lin, Brown Univ, Providence, RI; Andrea Z LaCroix, Univ of California San Diego, La Jolla, CA

Background:
Sleep, sedentary behavior (SB), and physical activity (PA) are independently associated with cardiometabolic health, but few studies have examined the interrelationships between 24 hour activity and cardiometabolic risk factors. Extending sleep may be a feasible cardiometabolic risk reduction strategy; however, research is needed to understand how replacing time in SB and/or PA with sleep impacts cardiometabolic risk.

Methods:
Women’s Health Initiative participants in the OPACH Study (N=3329; mean age=78.5±6) wore ActiGraph GT3X+ accelerometers 24 hours/day for up to 7 days. Sleep duration was derived using a validated protocol. Adjusted regression models estimated the relationship between sleep duration and cardiometabolic markers. Separately for shorter (<8 hours) and longer (≥8 hours) sleepers, isotemporal substitution models estimated the change in cardiometabolic risk markers associated with reallocating time in daytime activity (SB, light PA (LIPA), moderate to vigorous (MVPA)) to or from sleep.

Results:
Longer sleep duration was significantly associated with higher insulin, HOMA-IR, total cholesterol, triglycerides, and Reynolds Risk Score (RRS) (all p < 0.05). For shorter sleepers, reallocating 33 minutes of MVPA to sleep was associated with significantly higher values of insulin, HOMA-IR, triglycerides, waist circumference, and RRS (0.9%-11.4%) (Figure 1). Replacing 91 minutes of SB time with sleep was associated with significantly lower waist circumference (-1%). In longer sleepers, reallocating 74 minutes from sleep to LIPA was associated with significantly lower values of insulin, HOMA-IR, triglycerides, and waist circumference (-1.4% - -12.3%).

Conclusions:
This is one of the first isotemporal analysis to include objectively measured sleep duration. Results illuminate possible cardiometabolic risks and benefits of reallocating time to or from sleep duration.


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023

The Natural History of Cigarette Smoking From Childhood to Middle-Age: The International Childhood Cardiovascular Cohort (i3C) Consortium
**Tian Hu**, Sch of Public Health, Univ of Minnesota, Minneapolis, MN; Seana L Gall, Menzies Inst for Medical Res, Univ of Tasmania, Hobart, Australia; Rachel Widome, Sch of Public Health, Univ of Minnesota, Minneapolis, MN; Lydia A Bazzano, Tulane Univ Sch of Public Health and Tropical Med, New Orleans, LA; Trudy L Burns, Coll of Public Health, Univ of Iowa, Iowa City, IA; Stephen R Daniels, Univ of Colorado Sch of Med, Aurora, CO; Terence Dwyer, Oxford Martin Sch, Oxford Univ, Oxford, United Kingdom; Johanna Ikonen, Markus Juonala, Mika Kahonen, Univ of Turku, Turku, Finland; Ronald J Prineas, Wake Forest Univ, Winston-Salem, NC; Olli T Raitakari, Univ of Turku, Turku, Finland; Alan R Sinaiko, Julia Steinberger, Sch of Med, Univ of Minnesota, Minneapolis, MN; Elaine M Urbina, Univ of Cincinnati Coll of Med, Cincinnati, OH; Alison Venn, Menzies Inst for Medical Res, Univ of Tasmania, Hobart, Australia; Jorma Viikari, Univ of Turku, Turku, Finland; Jessica G Woo, Univ of Cincinnati Coll of Med, Cincinnati, OH; David R Jacobs Jr, Sch of Public Health, Univ of Minnesota, Minneapolis, MN

**Background:** Smoking is known to cause clinical cardiovascular disease. We report the natural history of smoking from childhood until average age 47 years in the large cohort followed in the International Childhood Cardiovascular Cohort (i3C) Consortium, which consists of seven long-standing cohorts in the US, Finland and Australia. Methods: Data on childhood smoking status were obtained from questionnaires answered during age 6-19 during the 1980s. Childhood smoking status was categorized as never smoker, tried smoking only a few times, tried more extensively (including quitters), and regular smoker. The i3C participants had follow-up visits until 2015-18 (Finland 2010-12), when they reported whether they were smokers during their 20s and/or 40s. Results: Of the 9977 participants, prevalence of regular smoking decreased from 35.5% in their 20s, to 20.5% in their 40s; cessation was unrelated to childhood smoking status. As shown in the Figure, among 1816 participants queried at age 18/19, prevalence of regular smoking in their 20s was 4.1% (36/886) in those who never smoked even during adolescence, 12% (22/183) in those who tried only a few times, 21.5% (40/186) in those who tried more extensively, and 76.5% (429/561) in those who were regular smokers during childhood. The pattern was similar among 860 whose last childhood smoking status was queried at age 16/17 (some probably experimented more during the remainder of childhood), but smoking in their 20s was more common for all smoking experimentation groups than in 18/19 year olds. Conclusions: These long-term follow-up data suggest that prevalence of adult smoking was significantly related to level of smoking experimentation during adolescence. However, cessation during adulthood does not depend on childhood smoking status. Policy change (such as taxes and restrictions on smoking indoors) has proven to be one of the most powerful tobacco control tools. These data support an emerging new policy strategy, namely raising the legal cigarette purchase age to 21 years.

The Timing of Cardiovascular Health Decline and Its Association With Subclinical Atherosclerosis in Adulthood

Lindsay R. Pool, Amy E. Krefman, Darwin Labarthe, Philip Greenland, Northwestern Univ, Chicago, IL; Markus Juonala, Univ of Turku, Turku, Finland; Mika Kähönen, Terho Lehtimäki, Univ of Tampere, Tampere, Finland; Rena S Day, Univ of Texas Health Science Ctr at Houston, Houston, TX; Lydia Bazzano, Tulane Univ, New Orleans, LA; Linda Van Horn, Lei Liu, Northwestern Univ, Chicago, IL; Camilo F Alonso, Larry S Webber, Tulane Univ, New Orleans, LA; Katja Pahkala, Tomi T. Laitinen, Olli Raitakari, Univ of Turku, Turku, Finland; Donald M. Lloyd-Jones, Norrina B. Allen, Northwestern Univ, Chicago, IL

Introduction: Declines in CVH beginning as early as childhood have been linked to development of subclinical atherosclerosis and CVD in adulthood; however, less is known about the timing and sequence. The objective of this study was to determine patterns for the loss of the health factors that comprise CVH and the associations with cIMT. Methods: We pooled data from five childhood/young adult cardiovascular cohorts including BHS, CARDIA, Young Finns, Project HBI, and STRIP. Available data allowed analysis of 4 of the 7 metrics that define CVH: BMI, blood pressure, total cholesterol, and blood glucose, categorized as ideal or non-ideal. We built a multi-trajectory model which fitted trajectory groups based on the simultaneous modeling of the loss of ideal CVH (defined as the probability of being ideal for a given health factor dropping below 50%), from childhood (ages 0-19) through early adulthood (ages 20-39) to middle adulthood (ages 40-59). Logistic regression was used to examine association of the trajectories and high cIMT. Results: There were 9,388 individuals included (55% female, 66% white), and 5 distinct trajectory groups were formed (Figure). As compared to those who maintained ideal levels of all four health factors, those who had a childhood loss of a single ideal health factor were about two times as likely to have high cIMT (cholesterol OR: 1.99; 95% CI 1.49-2.65; BMI OR: 1.91; 95% CI 1.45-2.53), while those with loss of more than one ideal health factors in childhood were 2.89 times more likely to have high cIMT (95% CI 2.21-3.78). The loss of ideal BMI and cholesterol during early adulthood was also associated with a higher likelihood of high cIMT than when ideal levels were retained to this age (OR: 1.47; 95% CI 1.10-1.97). Conclusions: Loss of multiple CVH factors in childhood was associated with the highest probability of developing subclinical atherosclerosis compared with retention of ideal levels into middle adulthood. These data add evidence of the importance of preserving ideal CVH beginning in childhood.


Funding: Yes
Association of Dietary Patterns and Lifetime Risk of Heart Failure: The Cardiovascular Disease Lifetime Risk Pooling Project


Introduction: Modifiable healthy lifestyle factors have been associated with lower risk of developing heart failure (HF). However, the role of dietary patterns in relation to lifetime risk (LR) of HF and years lived free of HF is not established. We hypothesized that better diet quality scores would be associated with lower risk of HF and more years lived free of HF.

Methods: We included individual-level pooled data from 7 US population-based cohorts stratified by index age groups (middle-aged [40-59 years] and older [60-79 years]), sex, and race. We calculated the alternate Healthy Eating Index-2010 (aHEI) score for all participants and performed (1) modified Kaplan-Meier analysis to estimate LR of HF, (2) competing Cox models (adjusted for age, smoking, education, body mass index, physical activity, hypertension, and diabetes) to estimate joint cumulative risks for HF or death, and (3) Irwin restricted mean to estimate years lived free of and with HF.

Results: Of the 39,082 middle-aged participants free of HF at baseline, 15% of participants were black and 84% were women. Over 125,214 person-years of follow-up, LR for HF was highest in those with the lowest quality diet (quintile 1) compared with those in higher aHEI quintiles (FIGURE). Competing hazard ratios for HF among middle-aged black men and women in the lowest quintile were 2.56 (95% confidence interval [CI] 1.38, 4.76) and 2.33 (95% CI 1.34, 4.04) compared with individuals in the highest quintile, with similar findings in white adults.

Discussion: A higher (better) diet quality score is independently associated with lower risk of HF and greater proportion of life lived without HF. Public health policies supporting adherence to the AHEI dietary recommendations may decrease the growing burden of HF.


Funding: No

Early Life Exposure to Green Areas and Diabetes Risk, an Assessment From Infancy to Early Teens


Background: Increasing empirical evidence suggests that exposure to nature (natural vegetation, or “greenness”) influences health. Studies have shown that greenness is related to lower diabetes risk possibly through mediation of physical activity, harmful environmental exposures, or mental health. However, to our knowledge, no previous study has reported on associations between greenness and insulin resistance in children. We hypothesize that children are more sensitive to environmental exposures particularly during critical windows of susceptibility. Our research aims to evaluate the early life association between greenness and insulin resistance and assess vulnerable life-periods in which individuals are more susceptible to their surroundings.

Methods: We use data from Project Viva, a longitudinal cohort study designed to study prenatal factors, pregnancy outcomes, and child health. From 1999 to 2002, we recruited pregnant women from a multispecialty group practice in Massachusetts. Of the 1,036 who attended the early teen research visit, we considered 460 participants who provided fasting blood and had complete data for all covariates and exposure at infancy (less than one year), early childhood (median age 3.3 years), mid-childhood (median age 7.7 years) and early teens (median age 13.2). We defined greenness exposure surrounding each participant’s address using 30m resolution Landsat satellite imagery [Normalized Difference Vegetation Index] at infancy (under one year of age), early childhood, mid-childhood, and early teens. Our main outcome measurement was the homeostatic model assessment to estimate insulin resistance (HOMA-IR) at the early teen visit.

Results: In models adjusted for age, race, sex, mother’s education, father’s education, household income and median household income from the census tract at delivery, living in the highest quintile of greenness in the 90-m area at the early teen visit was associated with 0.65 lower HOMA-IR (95%CI: -1.52, -0.40) than those in the lowest quintile. The observed association between higher greenness exposure and lower HOMA-IR in early teens was consistent for the 270-m area, although slightly attenuated, and no longer significant for the 1230-m area (mean HOMA-IR was 3.06, SD=2.08). We found no associations of exposure to greenness in the 90-m, 270-m or 1230-m areas around participants’ home at infancy, early childhood, or mid-childhood with early teenage HOMA-IR.

Conclusions: Higher levels of green vegetation, especially closer to the home, at the early teen visit were associated with lower insulin resistance at the same time period. Early exposure to green space during infancy, early childhood and mid-childhood was not associated with HOMA-IR as an early teenager. Early childhood longitudinal studies including geographic contextual factors across diverse populations are needed to confirm or refute these findings.


Funding: No

Funding Component:

027

The Menopausal Transition and Cerebrovascular Reactivity in the Coronary Artery Risk Development in Young Adults Study
Muna J. Tahir, Pamela J. Schreiner, Univ of Minnesota, Minneapolis, MN; Ilya M. Nasrallah, Univ of Pennsylvania Health System, Philadelphia, PA; Martine Elbejjani, American Univ of Beirut, Beirut, Lebanon; Melissa F. Wellons, Vanderbilt Univ Medical Ctr, Nashville, TN; R Nick Bryan, The Univ of Texas at Austin, Austin, TX; Lenore J. Launer, Natl Inst on Aging, Natl Insts of Health, Bethesda, MD

Background: Estrogen induces vasodilation in cerebral arteries and therefore increases perfusion to brain regions as needed. The menopausal transition, a state of variably declining endogenous estrogen levels, may be related to poorer cerebrovascular function. This study aims to investigate the association of menopausal status with cerebrovascular reactivity (CVR).

Methods: The sample included women [N= 353] from the Coronary Artery Risk Development in Young Adults (CARDIA) Study who self-reported their reproductive histories and participated in the brain magnetic resonance imaging (MRI) sub-study at the year 25 follow-up examination. Menopausal status was classified as premenopause, perimenopause and postmenopause based on menstrual cycle regularity or cessation. CVR, a measure of vascular responsiveness to hypoxia, was calculated as mean percent change in blood-oxygen level dependent signals in activated voxels following a breath-hold test. Multiple linear regression models were used to examine the cross-sectional associations of menopausal status with total brain, gray matter and white matter CVR.

Results: Women were mean age 50.4 ± 3.5 years; 42% were black; 56% were postmenopausal, 24% were perimenopausal and 20% were premenopausal. Following adjustment for hormone replacement therapy, and demographic, cardiovascular and behavioral risk factors, postmenopause versus premenopause was associated with less total, gray matter and white matter CVR (Table). Compared to premenopause, perimenopause showed no associations with CVR (Table).

Conclusions: In this population-based sample of middle-aged women, postmenopausal status was associated with lower CVR, a marker for arterial stiffness and vascular aging, compared to premenopause; no difference was observed for perimenopause. While cross-sectional, these data suggest that interventions to prevent postmenopausal cerebrovascular function decline may still be initiated during perimenopause.


Funding: No

Funding Component:

028

Increase in Abdominal Visceral Adipose Tissue Accelerates Two Years Prior to Menopause: The Study of Women’s Health Across the Nation (SWAN) Heart

Saad Samargandy, Karen A. Matthews, Maria M. Brooks, Emma Barinas-Mitchell, Jared W. Magnani, Univ of Pittsburgh, Pittsburgh, PA; Imke Janssen, Rasa Kazlauskaite, Rush Univ, Chicago, IL; Samar R. El Khoudary, Univ of Pittsburgh, Pittsburgh, PA

Introduction: Abdominal visceral adipose tissue (VAT) contributes to pathogenesis of cardiometabolic disease through endocrine and paracrine secretion of adipocytokines. Midlife women experience adipose tissue redistribution towards increasing central adiposity. A few studies suggested a contribution of the
menopausal transition, but evidence is lacking to characterize the change in VAT relative to time of the final menstrual period (FMP). We hypothesized that VAT would change non-linearly relative to FMP with a significant rise close to FMP. **Methods:** We evaluated participants with no self-reported CVD from the SWAN Heart Ancillary study. Women had up to two computed tomographic planimetric measurements of VAT over a median of 2.2 years of follow-up and known dates of FMP. LOESS splines were used to determine potential inflection points of VAT change relative to FMP. Piecewise linear mixed-effects models were used to estimate and compare yearly % changes in VAT at LOESS spline-identified time segments. **Results:** The study included 321 women (at baseline: mean age (SD) of 51.0 (2.8) years; 60% White, 40% Black; 9% premenopausal, 51% early/13% late perimenopausal, and 27% postmenopausal). LOESS splines suggested a non-linear association between VAT change and time of FMP with two inflection points demarcating 3 segments: segment 1: > 2 years before FMP, segment 2: 2 years before FMP to the FMP, and segment 3: after FMP (Figure). Adjusting for covariates listed under the Figure, VAT increased significantly by 10.5% (95% CI: 5.9, 15.3) per year in segment 2, and this increase was greater than changes in segments 1 [1.3% (-2.0, 4.7)] and 3 [3.1% (0.8, 5.4)], both P=0.01. Additional adjustment for concurrent body mass index attenuated difference only between segments 2 and 3 (P=0.07). **Conclusions:** Women show significantly faster increase in VAT two years prior to menopause, which may place them at greater risk of cardiometabolic outcomes later in life. These results encourage lifestyle modifications early in menopausal transition.


**Funding:** No

**Funding Component:**

**029**

**Cardiovascular Health and Cognitive Decline in Older Adults: The Cardiovascular Health Study**

Kristine MaWhinney, Mamadou D Tounkara, Kirsten Evans, Emily Startup, Alexa Ehler, Emarie Covey, Jordan Westra, Natalie J Blades, Brigham Young Univ, Provo, UT; Mandip S Dhamoon, Mount Sinai, New York, NY; Hector M Gonzalez, Univ of California, San Diego, San Diego, CA; Fumiaki Imamura, MRC Epidemiology Unit, Cambridge, United Kingdom; Elżbieta Kuzma, Univ of Exeter, Exeter, United Kingdom; David J Llewellyn, Univ of Exeter and The Alan Turing Inst, Exeter, United Kingdom; M Lelinneth B Novilla, Monica Scrobotovici, Brigham Young Univ, Provo, UT; W T Longstreth Jr, Univ of Washington, Seattle, WA; Evan L Thacker, Brigham Young Univ, Provo, UT

**OBJECTIVE:** The AHA Life’s Simple 7 (LS7) defines cardiovascular health with smoking, physical activity, diet quality, body mass index (BMI), blood pressure, total cholesterol, and
blood glucose. We examined associations of LS7 score and its components with cognitive decline in older adults. METHODS: The Cardiovascular Heart Study is a longitudinal cohort of 5,888 adults aged 65 and above. We analyzed 4,165 who had LS7 score measured at baseline (1989), complete covariate data, and at least one Modified Mini-Mental State Examination (3MS) score during follow-up (through 1998). We scored each LS7 component as ideal (2), intermediate (1), or poor (0), summed all components to a total LS7 score ranging from 0 (worst) to 14 (best), and categorized total LS7 score as ideal (10-14), intermediate (5-9), or poor (0-4). 3MS is a measure of global cognition ranging from 0 (worst) to 100 (best) and was obtained annually during a mean follow-up of 6.8 years. Using linear mixed models, we estimated associations of LS7 score and its components with annual rate of cognitive decline, adjusted for demographic, behavioral, and clinical factors. RESULTS: In adjusted models, mean annual decline in 3MS score was 0.83 points (95% CI: 0.61, 1.04) for those with poor LS7 scores at baseline, 0.63 points (95% CI: 0.59, 0.67) with intermediate scores, and 0.42 points (95% CI: 0.37, 0.47) with ideal scores (p < 0.0001 for difference in mean annual decline across LS7 categories). Better physical activity, diet quality, blood pressure control, and blood glucose control were all associated with slower cognitive decline (Table). BMI, however, was opposite, with obesity (poor) associated with slower decline, and normal weight (ideal) associated with faster decline (p < 0.0001). CONCLUSIONS: Better cardiovascular health measured by LS7 in old age is associated with slower average cognitive decline. The role of BMI as a component of LS7 in older adults may warrant reconsideration, as lower BMI in late-life may represent frailty and increased risk for cognitive decline.

<table>
<thead>
<tr>
<th>LS7 component</th>
<th>Mean annual decline in 3MS score (95% CI)</th>
<th>P for difference across categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td>0.56 (0.53, 0.59)</td>
<td>—</td>
</tr>
<tr>
<td>Physical activity</td>
<td>0.63 (0.41, 1.02)</td>
<td>0.60 (0.35, 0.65)</td>
</tr>
<tr>
<td>Diet quality</td>
<td>0.66 (0.59, 0.74)</td>
<td>0.55 (0.32, 0.59)</td>
</tr>
<tr>
<td>Body mass index</td>
<td>0.45 (0.38, 0.52)</td>
<td>0.54 (0.45, 0.55)</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>0.71 (0.65, 0.76)</td>
<td>0.53 (0.48, 0.58)</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>0.56 (0.49, 0.62)</td>
<td>0.59 (0.54, 0.64)</td>
</tr>
<tr>
<td>Blood glucose</td>
<td>0.77 (0.68, 0.86)</td>
<td>0.59 (0.53, 0.64)</td>
</tr>
</tbody>
</table>

Adjusted for birth year, age, sex, race, CHS clinic site, education, alcohol use, chronic kidney disease, depressive symptoms, stroke, coronary heart disease, heart failure, and atrial fibrillation. Each LS7 component also adjusted for the other six components.


Funding: No

Funding Component: 030

Dietary Inflammatory Potential is Associated with Cardiovascular Disease Risk in Two Large Prospective Cohort Studies of US Men and Women


Introduction: Chronic inflammation plays a pathogenic role in cardiovascular disease (CVD) development. Dietary factors have been implicated in CVD etiology and may have an impact on chronic inflammation.

Hypothesis: Proinflammatory diets are associated with higher CVD risk.
Methods: We include 74,544 women in the Nurses’ Health Study (from 1984 through 2012) and 43,904 men in the Health Professionals Follow-up Study (from 1986 through 2012), who were free of heart disease, stroke, and cancer at baseline. Dietary inflammatory potentials were assessed using an empirical dietary inflammatory pattern (EDIP) score that has been pre-defined by 18 food components based on their associations with circulating levels of systemic inflammation markers C-reactive protein, interleukin-6, and tumor necrosis factor-α receptor 2. Adjusted hazard ratios (HRs) and 95% confidence intervals (CIs) for CVD were calculated using Cox regressions.

Results: During 2,831,128 person-years of follow-up, we documented 13,249 incident CVD cases, including 8,178 coronary heart disease cases and 5,182 stroke cases. After adjusting for established risk factors and potential confounders including body-mass index and aspirin or other nonsteroidal anti-inflammatory medication use, a higher EDIP score was associated with an increased risk of CVD (in pooled analyses, HR [95% CI] comparing the highest to the lowest quintiles were 1.29 [1.22 to 1.37]; \( P_{\text{trend}} < 0.001 \)), CHD (HR = 1.32 [1.23 to 1.42]; \( P_{\text{trend}} < 0.001 \)), and stroke (HR = 1.25 [1.14 to 1.37]; \( P_{\text{trend}} < 0.001 \)). Associations were similar among subgroups of participants, including by age, sex, family history, BMI, physical activity, and alcohol intake; but were stronger among non/past-smoking than current smoking women (\( P_{\text{interaction}} < 0.002 \)).

Conclusions: Findings from two large US prospective cohort studies suggest that inflammation may be a potential mechanism linking dietary patterns to CVD progression. Reducing the proinflammatory potentials of the diet may assist CVD prevention.


Funding: No

Funding Component:

031

County Poverty Disproportionately Affects Mortality in Heart Failure Compared to Coronary Heart Disease

Khansa Ahmad, Edward Chen, Umair Nazir, Amal Trivedi, Sebhat Erqou, Wen-chih Wu, Brown Univ, Providence, RI

Background Regional poverty has been associated with worse outcomes in stroke, myocardial infarction and overall cardiovascular mortality. There is paucity of data regarding regional socioeconomic (SE) factors and outcomes in heart failure (HF). We studied the association between SE factors and HF mortality and compared it with CHD mortality at a regional level. Methods This is a cross sectional analysis of all US counties (n=3141) from 2010-2015. County level data for SE factors, risk factor prevalence and demographics were collected from CDC and Census Bureau. Counties (n=6) with insufficient mortality data were excluded. In 2014, poverty threshold was $11,670 for 1-person household. Mortality data was derived from death certificates, published by National Center for Health Statistics. Random sampling (n=50) was used to compare the strength of correlation for the strongest SE
factor (poverty, employment, education and uninsured %) with HF and CHD mortality. Population weighted multivariate linear regression analyses were used to relate the strongest SE factor and HF mortality, adjusted for risk factor prevalence and demographics.

**Results** We studied 3,135 counties with median(IQR) of poverty (15.8% (12.4% - 20.1%)), male (49.5% (48.9% - 50.4%)), white (84.6% (63.4% - 93.1%)), ≥ 65 yrs. (17.2% (14.7% - 19.9%)), number of HF hospitalizations/1000 Medicare beneficiaries (13.9 (9.2-17.6)) and HF deaths/100,000 (189.5 (164.7-219.1)). Of all SE factors, poverty% has the strongest association with HF mortality, disproportionately higher for HF than CHD (p=0.000). Our final model explains 61.7% of variation in regional HF mortality. Poverty remains an independent risk factor despite adjusting for demographics, other SE factors and risk factor prevalence.

**Conclusion** County poverty disproportionately effects HF mortality as compared to CHD mortality, independent of demographics and risk factor prevalence. Future studies examining additional mechanism of this association are needed to reform health policy.

<table>
<thead>
<tr>
<th>Socioeconomic Factors Associated with Heart Failure Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>Poverty%</td>
</tr>
<tr>
<td>Unemployed%</td>
</tr>
<tr>
<td>Median household income</td>
</tr>
<tr>
<td>Unemployment Rate</td>
</tr>
<tr>
<td>Lack of High School Education</td>
</tr>
</tbody>
</table>

**Disclosures:**

K. Ahmad: None. E. Chen: None. U. Nazir: None. A. Trivedi: None. S. Erqou: None. W. Wu: None.

**Funding:** No

**Funding Component:**

| 032 |

**Rural Versus Urban Living and Incident Cognitive Impairment in the Reasons for Geographic and Racial Differences in Stroke Study (REGARDS)**

Matthew L Harris, Erica Bennion, Kristine MaWhinney, Brigham Young Univ, Provo, UT; Virginia J Howard, Virginia G Wadley, Univ of Alabama at Birmingham, Birmingham, AL; Leslie A McClure, Drexel Univ, Philadelphia, PA; Deborah A Levine, Univ of Michigan, Ann Arbor, MI; Jennifer J Manly, Columbia Univ, New York, NY; Maria M Glymour, Univ of California, San Francisco, San Francisco, CA; Jonathan J Wisco, Boston Univ Sch of Med, Boston, MA; Robert A Chaney, Evan L Thacker, Brigham Young Univ, Provo, UT

**OBJECTIVE:** To estimate the association of rural vs urban living in the United States (US) with incident cognitive impairment (ICI), and to assess confounding, mediation, and effect heterogeneity by demographic, social, behavioral, and clinical risk factors. METHODS: REGARDS is a cohort of 30,239 adults aged 45+ in the 48 contiguous states. We analyzed 20,592 participants who at baseline (2003-2007) were cognitively intact with no history of stroke and had cognition assessed an average of 7.1 years later. We used Rural-Urban Commuting Area (RUCA) codes to classify participants as urban (n = 16,436), large city/town (n = 2,420), or small/isolated rural (n = 1,736) at baseline. We defined ICI as falling ≥1.5 SD below the mean on at least two of three cognitive tests administered during follow-up: word list learning, word list delayed recall, and animal naming. Using urban as the referent, we...
estimated odds ratios of ICI for rural and for large city/town. RESULTS: ICI occurred in 1,291 participants (6.3%). Rural residents had 49% higher odds of ICI adjusted for confounding by demographics (Model 2 in Table, OR = 1.49 [95% CI: 1.19, 1.85]). After further adjusting for potential mediators (Models 3-6), odds of ICI remained 25% higher for rural vs urban (Model 6, OR = 1.25 [0.99, 1.56]). In assessing effect heterogeneity, we found synergism of rural dwelling with black race, physical inactivity, and low self-rated health (all P < 0.1; see ORs in Table), but not for other ICI risk factors. We found no difference in ICI for large city/town vs urban (demographics-adjusted OR = 1.08 [0.88, 1.33]; fully adjusted OR = 0.95 [0.77, 1.18]), and no effect heterogeneity of ICI risk factors by large city/town (all P > 0.2). CONCLUSION: Rural living is an important social determinant of cognitive health in the US. ICI was significantly more frequent among rural dwellers than urban dwellers, partly due to confounding or mediation by ICI risk factors. Odds of ICI were highest for rural dwelling combined with black race, physical inactivity, or low self-rated health.

### TABLE. Association of small isolated rural residence with ICI (n=20,592)

<table>
<thead>
<tr>
<th>Assessment of confounding and mediators</th>
<th>Small / Isolated rural vs urban (reference)</th>
<th>OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: Unadjusted</td>
<td>1.10 (0.97, 1.25)</td>
<td>0.020</td>
<td></td>
</tr>
<tr>
<td>Model 2: Adjusted for demographics (covariates)</td>
<td>1.49 (1.19, 1.87)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Model 3: Adjusted for Model 2 variables + social factors</td>
<td>1.50 (1.08, 1.83)</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Model 4: Adjusted for Model 3 variables + health behaviors</td>
<td>1.28 (1.02, 1.60)</td>
<td>0.036</td>
<td></td>
</tr>
<tr>
<td>Model 5: Adjusted for Model 4 variables + clinical factors</td>
<td>1.25 (1.06, 1.47)</td>
<td>0.032</td>
<td></td>
</tr>
<tr>
<td>Model 6: Adjusted for Model 5 variables + race &amp; income</td>
<td>1.25 (0.99, 1.56)</td>
<td>0.098</td>
<td></td>
</tr>
</tbody>
</table>

Assessment of effect heterogeneity: RACE

| Rural | Black: multiplicative interaction | 1.53 (0.97, 2.41) | 0.068 |
| Urban | white (reference) | 1.00 (reference) | |
| Rural & black (main effect of race) | 1.69 (1.46, 1.93) | |

Assessment of effect heterogeneity: PHYSICAL ACTIVITY

| Rural | Physically active (reference) | 1.00 (reference) | |
| Rural & physically active (main effect of physical activity) | 1.07 (0.83, 1.39) | |

Assessment of effect heterogeneity: SELF-RATED HEALTH

| Rural & fair or poor health: multiplicative interaction | 1.54 (0.94, 2.53) | 0.087 |
| Urban & good or better health (reference) | 1.00 (reference) | |
| Rural & fair or poor health (main effect of fair or poor health) | 1.16 (0.94, 1.41) | |
| Rural & good or better health (main effect of fair or poor health) | 1.07 (0.83, 1.37) | |
| Rural & fair or poor health (joint effect of fair or poor health & race) | 1.91 (1.03, 3.49) | |


Funding: No

Funding Component: 033

**Directly Measured Triglyceride-Rich Lipoprotein Cholesterol and Small Dense LDL-C Cholesterol Concentrations Associate With Incident Cardiovascular Disease: Prospective Data From the Women’s Health Study**

Edward K Duran, Brigham and Women’s Hosp, Boston, MA; Aaron W Aday, Vanderbilt Univ Medical Ctr, Nashville, TN; Nancy Cook, Julie E Buring, Paul M Ridker, Aruna D Pradhan, Brigham and Women’s Hosp, Boston, MA

**BACKGROUND:** Elevated triglyceride rich lipoproteins (TRLs) and small dense LDL (sdLDL) levels are hallmarks of atherogenic dyslipidemia and the cholesterol content of these particles is hypothesized to drive atherosclerotic risk. However, laboratory quantitation has thus far been impractical with limited prospective clinical data utilizing directly measured levels of this cholesterol burden. METHODS: We conducted a prospective case-cohort study within the Women’s Health Study. Randomly selected CVD case subjects (n=500) were compared to a reference subcohort (n=496). TRL-C and sdLDL-C (mg/dl) were directly measured in baseline blood specimens. Cox proportional hazards models were used to compute quartile-specific multivariable-adjusted HRs for total CVD and individual outcomes of coronary and cerebrovascular disease (CCVD) and peripheral artery disease (PAD). Clinical models also adjusted for LDL-C and hsCRP. RESULTS: TRL-C and sdLDL-C were strongly correlated (ρ=0.716, p<0.001) and levels were higher in case subjects than in the reference risk set. The risk of each outcome increased across quartiles of TRL-C (HRadj Q4 vs
Q1: total events 1.87, 95% CI 1.14 - 3.06, p=0.012; CCVD 1.81, 95% CI 1.05 - 3.06, p = 0.030; PAD 2.43, 95% CI 1.11 - 5.31, p=0.039). In contrast, elevated sdLDL-C associated with incident CCVD but not PAD (HRadj Q4 vs Q1: total events 1.85, 95% CI 1.04 - 3.31, p=0.014; CCVD 2.17, 95% CI 1.14 - 4.13, p = 0.006; PAD 1.34, 95% CI 0.54 - 3.33, p=0.389). CONCLUSION: Directly measured TRL-C and sdLDL-C concentrations are strongly linked to incident CVD with potentially differential effects for PAD. These findings may indicate a greater potential benefit of therapeutics targeting TRL-C rather than LDL in the prevention of PAD.

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**E.K. Duran:** None.  
**A.W. Aday:** None.  
**N.R. Cook:** None.  
**J.E. Buring:** None.  
**P.M. Ridker:** C. Other Research Support; Modest; National Heart, Lung, and Blood Institute, National Cancer Institute, American Heart Association, Doris Duke Charitable Foundation, Leducq Foundation, Donald W Reynolds Foundation, James and Polly Annenberg La Vea Charitable Trusts, Astra-Zeneca, Novartis, Pfizer, Kowa, Amgen. F. Ownership Interest; Modest; Dr Ridker is listed as a co-inventor on patents held by the Brigham and Women's Hospital that relate to the use of inflammatory biomarkers in cardiovascular disease that have been licensed to Siemens. G. Consultant/Advisory Board; Modest; Quintiles, Novartis, Inflazome, Easai, Sanofi, Jansen.  
**A.D. Pradhan:** B. Research Grant; Modest; Denka Seiken Co., Ltd.  

**Funding:** No  

**Omega-3 Fatty Acid Biomarkers and Incident Type 2 Diabetes: An Individual Participant-level Pooling Project of 20 Prospective Cohort Studies**

**Frank Qian,** Andres V Ardisson Korat, Dept of Nutrition, Harvard T.H. Chan Sch of Public Health, Boston, MA; Fumiaki Imamura, Medical Res Council Epidemiology Unit, Univ of Cambridge, Cambridge, United Kingdom; Matti Marklund, Dept of Public Health and Caring Sciences, Clinical Nutrition and Metabolism, Uppsala Univ, Uppsala, Sweden; Nathan Tintle, Dept of Mathematics and Statistics, Dordt Coll, Sioux Center, IA; Jyrki K Virtanen, Inst of Public Health and Clinical Nutrition, Univ of Eastern Finland, Kuopio, Finland; Xia Zhou, Div of Epidemiology and Community Health, Univ of Minnesota Sch of Public Health, Minneapolis, MN; Julie K Bassett, Cancer Epidemiology and Intelligence Div, Cancer Council Victoria, Melbourne, Australia; Heidi Lai, Friedman Sch of Nutrition Science and Policy, Tufts Univ, Boston, MA; Yoichiro Hirakawa, Dept of Epidemiology and Public Health, Graduate Sch of Medical Sciences, Kyushu Univ, Fukuoka, Japan; Kuo-Liong Chien, Inst of Epidemiology and Preventive Med, Coll of Public Health, Natl Taiwan Univ, Taipei, Taiwan; Alexis C Frazier-Wood, US Dept of Agriculture/Agricultural Res Service, Children`s Nutrition Res Ctr, Houston, TX; Maria Lankinen, Inst of Public Health and Clinical Nutrition, Univ of Eastern Finland, Kuopio, Finland; Rachel A Murphy, Univ of British Columbia, Vancouver, BC, Canada; Cecilia Samieri, Univ of Bordeaux, INSERM, Bordeaux Population Health Res Ctr, UMR 1219, Bordeaux, France; Johanna M Geleijnse, Div of Human Nutrition, Wageningen Univ, Wageningen, Netherlands; Vanessa de Mello, Inst of Public Health and Clinical Nutrition, Univ of Eastern Finland, Kuopio, Finland; Nita G Forouhi, Medical Res Council Epidemiology Unit, Univ of Cambridge, Cambridge, United
Background: Effects of omega-3 fatty acids on the prevention of type 2 diabetes (T2D) are unclear. Relatively few prospective studies have utilized objective omega-3 biomarkers to assess risk.

Aims: To assess the prospective relationship between circulating and tissue levels of alpha linoleic acid (ALA), eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA), and docosahexaenoic acid (DHA), with respect to risk of T2D.

Methods: A global consortium of 20 prospective cohort studies from 14 nations with assessments of ALA, EPA, DPA, or DHA in adults (age > 18 years) were identified through July 2017 and included in this investigation. A pre-specified analytic protocol, including definitions for exposures, covariate list, disease outcome definitions, and subgroup analyses was developed and followed in new participant-level cohort analysis. Associations were pooled using inverse variance-weighted meta-analysis.

Results: Among 65,147 participants, 16,693 incident cases of T2D occurred during follow-up (median follow-up in the cohorts ranged from 2.5 to 21.2 years). In pooled multivariate analysis, per interquintile range (difference between the midpoints of the first and fifth quintile for each fatty acid), EPA, DPA, DHA, and their sum (Figure 1) were associated with 8%, 21%, 18%, and 19% lower risk of T2D, respectively (all P<0.001). Higher levels of ALA were not significantly associated with T2D. Associations were consistent across different lipid compartments and pre-specified subgroups, including by age, sex, and geographic region, as well as in several sensitivity analyses.

Conclusion: Higher circulating and tissue biomarkers of seafood-derived omega-3 fatty acids, EPA, DPA, and DHA, were associated with lower risk of T2D in a global consortium of prospective studies. Plant-derived ALA was not significantly associated with risk.

Comparative Effectiveness of Long-term Lifestyle and Pharmacological Interventions for Primary Prevention of Type 2 Diabetes: a Network Meta-analysis of Randomized Controlled Trials

Huilin Tang, Jin Xia, Keming Yang, Yiqing Song, Indiana Univ, Indianapolis, IN

Background: Lifestyle modification and some pharmacological interventions have been proven effective in preventing type 2 diabetes (T2D) in previous primary prevention trials. However, there is controversy regarding their comparative effectiveness because of the lack of head-to-head trials for all possible comparisons among different interventions. Network meta-analysis enables us to simultaneously evaluate the relative effectiveness among all interventions by synthesizing both direct evidence from head-to-head trials and indirect evidence through more than one common comparator while maintaining randomization. **Objective:** We performed a network meta-analysis of randomized controlled trials (RCTs) to directly and indirectly compare lifestyle modification and five commonly prescribed medications (insulin sensitizers, insulin secretagogues, alpha-glucosidase inhibitors, weight-loss drugs, and renin-angiotensin system blockade), and to rank their relative effectiveness for primary prevention of T2D among adults with prediabetes at enrollment. **Methods:** We systematically searched PubMed, Embase, and CENTRAL from inception to October 2018 and identified long-term RCTs (follow-up ≥ 1 year) that evaluated the interventions for T2D prevention in adults with prediabetes (e.g., impaired fasting glucose and impaired glucose tolerance). A network meta-analysis using the frequentist approaches was conducted to calculate the summary odds ratio (OR) and 95% confidence interval (CI) for each active intervention in comparison with controls (i.e., usual care alone or with placebo or control pills) and rank the effectiveness of these interventions by the surface under the cumulative ranking curve probabilities. **Results:** Thirty-three RCTs involving 54,910 individuals with prediabetes and 13,189 diabetic cases were included. Network meta-analysis showed that lifestyle modification (OR, 0.53; 95% CI, 0.42 to 0.66), insulin sensitizers (0.44; 0.31 to 0.62), alpha-glucosidase inhibitors (0.60; 0.42 to 0.87), and weight-loss drugs (0.39; 0.23 to 0.66) were significantly associated with decreased risk of incident T2D as compared with the controls. Neither insulin secretagogues (0.80; 0.51 to 1.26) nor renin-angiotensin system blockade (0.93; 0.62 to 1.38) were significantly associated with lower risk of developing T2D. Ranking of these interventions revealed weight-loss drugs being the optimal intervention for preventing T2D (89.5%), followed by insulin sensitizers (84.1%), lifestyle modification (66.7%), and alpha-glucosidase inhibitors (54.4%). **Conclusions:** Among the four interventions (lifestyle modification, insulin sensitizers, alpha-glucosidase inhibitors, and weight-loss drugs) which showed significant benefits on the primary prevention of T2D, weight-loss drugs seem to be the most effective.


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Funding Component:
**Shakia T Hardy, Carmen Ng, Solveig Cunningham, Michael Kramer, Emory Univ, Atlanta, GA**

**Introduction:** Childhood obesity is a growing epidemic in the United States with approximately 1 in 5 children being obese. Although prevalence estimates for childhood obesity are regularly updated, little is known about the current incidence of childhood obesity among a nationally representative population, since initial estimates were provided by the Early Childhood Longitudinal Study Kindergarten (ECLS-K) Class of 1998.

**Methods:** We estimated the annual incidence of obesity and the cumulative incidence of obesity over 5 years using the contemporary ECLS-K Class of 2011 (analytic sample = 7019). Height and weight were measured at eight time points between kindergarten (2010) and fourth grade (2015). We defined normal weight (<85th percentile), overweight (85th-95th percentile), and obesity (>95th percentile) using Centers for Disease Control and Prevention sex- and age-specific growth curves.

**Results:** At kindergarten entry (mean age 5.6 years), 15.5% of children were overweight and 14.7% of children were obese; in fourth grade (mean age 10.1 years) overweight prevalence had increased to 17.3% and obesity prevalence had increased to 20.1%. Kindergarteners who were overweight were 6 times as likely as normal-weight kindergarteners to become obese by fourth grade (5-year cumulative incidence, 30.5% vs. 5.2%). In early elementary school, annualized obesity incidence proportions were higher over summer breaks (5.6% and 5.4% during summer breaks from Kindergarten to first grade and first grade to second grade, respectively) than during the school year (3.8% and 3.8% during Kindergarten and first grade school years, respectively). Incident obesity was higher among boys compared girls, non-Hispanic black and Hispanic children compared to non-Hispanic white children, and among those from the poorest socioeconomic quintiles compared to the highest socioeconomic quintile.

**Conclusions:** Incident obesity between the ages of 5 and 10 years was more likely to have occurred during summer breaks and primarily among children who had entered kindergarten overweight. Childhood obesity prevention efforts should focus on the prevention of overweight prior to kindergarten and investigate causes of summer weight gain during elementary school.

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037

**The U.S. Food and Drug Administration’s Metformin Label Change Reduces Racial Disparity in Metformin Use by Increasing Its Use Among Black Patients With Type 2 Diabetes and Moderately Impaired Kidney Function**

**Jung-Im Shin, Johns Hopkins Univ, Baltimore, MD; Alex Chang, Kidney Health Res Inst, Geisinger, Danville, PA; Josef Coresh, Johns Hopkins Univ, Baltimore, MD; Lesley A. Inker, Tufts Medical Ctr, Boston, MA; Elizabeth Selvin, Morgan Grams, Johns Hopkins Univ, Baltimore, MD**

**Introduction:** Historically, metformin was contraindicated in people with type 2 diabetes (T2D) and kidney disease due to concerns of lactic acidosis. The U.S. Food and Drug Administration (FDA) recently changed metformin label from serum creatinine (sCr)-based to estimated glomerular filtration (eGFR)-based indication, expanding its use for people with eGFR≥30 mL/min/1.73 m². The purpose of our study is to assess the effects of the label change on metformin use among people with T2D, stratified by race and eGFR.

**Hypothesis:** Because sCr levels are higher in blacks than in whites at the same level of eGFR,
we hypothesized that the label change increases metformin use in people with T2D and kidney disease and magnitude of increase is greater in blacks than in whites.

**Methods:** One-year period prevalence cohort was created for each of before and after the FDA’s label change (April 8, 2016) in Johns Hopkins Medicine, including people with T2D and eGFR≥30 mL/min/1.73 m². We estimated the prevalence of metformin use in each cohort, stratified by eGFR within each race.

**Results:** Mean age of study population (N=15,880) was 61 years, 52% were women, 48% were black, mean eGFR was 81 mL/min/1.73 m², and mean HbA1c was 7.8%. Before the label change, blacks with eGFR 30-44 mL/min/1.73 m² were less likely to use metformin compared to whites, controlling for age, sex, eGFR, and HbA1c (odds ratio [OR]=0.49 [95% confidence interval: 0.37-0.65]). The label change did not increase metformin use among whites across all categories of eGFR, whereas it increased metformin use from 26.1% to 32.6% (P=0.03) among blacks with eGFR 30-44 mL/min/1.73 m² (Figure). As a result, magnitude of racial disparity in metformin use after the label change was attenuated (OR=0.75 [0.57-0.99]).

**Conclusions:** The recent eGFR-based metformin label change increased its use in black people with T2D and moderately impaired kidney function, with reducing racial disparity of metformin use. Further studies to assess impact of metformin label change with longer study period are warranted.
N=25,258 respectively) were analyzed. Prevalence of meeting the aerobic guideline was estimated overall and by CVD status (no CVD/not at risk; at risk for CVD: overweight or has obesity and ≥1 of diabetes, high cholesterol, or having CVD). T-tests were used to identify significant differences. Results: Similar differences in age-adjusted prevalence of meeting the aerobic guideline were observed across CVD statuses in both 2012 and 2017, with adults with no CVD and not at risk having the highest prevalence (57.7% in 2017) and those with CVD having the lowest prevalence (38.5% in 2017) (p<0.05). From 2012 to 2017, prevalence increased significantly overall (7.8%), among those with no CVD and not at risk (7.8%), and among those at risk (13.0%) (p<0.001). Among those with CVD, the increase (8.5%) was not significant. Conclusions: Prevalence of meeting the aerobic guideline showed significant improvement among adults with better CVD statuses; however, only about half of those at risk and 39% of those with CVD currently meet the aerobic guideline. The anticipated release of the 2nd edition of the Physical Activity Guidelines presents an important opportunity for promoting physical activity. Efforts to identify and address the barriers those with higher CVD risk face could help prevent or manage CVD.

Table 1: Age-adjusted prevalence of meeting the aerobic component of the 2018 Physical Activity Guidelines for Americans by cardiovascular disease status. *National Health and Nutrition Examination Surveys (NHANES) 2011-2017

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>2012</th>
<th>2017</th>
<th>Change from 2012 to 2017</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No CVD or not at risk</td>
<td>57.7</td>
<td>57.7</td>
<td>0.0</td>
<td>1.0</td>
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<tr>
<td>CVD or at risk</td>
<td>38.5</td>
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<td>1.0</td>
</tr>
<tr>
<td>No CVD or not at risk</td>
<td>57.7</td>
<td>57.7</td>
<td>0.0</td>
<td>1.0</td>
</tr>
<tr>
<td>CVD or at risk</td>
<td>38.5</td>
<td>38.5</td>
<td>0.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>


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Funding Component: 039

Low Levels of Moderate to Vigorous Physical Activity is Associated With Fewer Years Lived Free of Cardiovascular Disease: The Cardiovascular Lifetime Risk Pooling Project

Amanda Paluch, Northwestern Univ, Chicago, IL; Hongyan Ning, Mercedes Carnethon, Northwestern Univ Feinberg Sch of Med, Chicago, IL; Kelley Pettee Gabriel, Univ of Texas Health Science Ctr at Houston, Sch of Public Health - Austin Campus, Austin, TX; Nnorina Allen, Donald Lloyd-Jones, John Wilkins, Northwestern Univ Feinberg Sch of Med, Chicago, IL

Background: Quantifying the associations of moderate to vigorous intensity physical activity (MVPA) with years lived free of cardiovascular disease (CVD) allows for contextualization of the population burden and provides a metric for clinician-patient communication. We hypothesized that individuals with lower levels of MVPA during middle age will have fewer years lived free of CVD compared to those with higher levels.

Methods: A standardized z-score for MVPA was created based on participant-reported physical activity in 28,466 middle aged adults aged 40-59 years (43.6% women) in 6 U.S. prospective cohort studies. Z-scores were then categorized into quartiles for each cohort. Rates (person-years) of incident CVD and death were summed for participants up to age 95 years, or to the oldest age of observation. Irwin’s restricted mean was used to calculate years lived free from CVD and overall survival stratified by sex.

Results: Over 514,324 person-years of follow-up, 3,556 CVD events were observed. Whereas there was no difference in survival time among participants in the upper 3 quartiles, women in the lowest quartile vs. the next lowest quartile lived 3.2 fewer years and men lived 1.2 fewer years free of CVD. Survival after a CVD event was lower for women in the lowest MVPA quartile (mean±S.E: 0.07±0.32 years) compared to all other quartiles (Q2: 0.67±0.16 years to Q4: 0.96±0.16 years). Survival after CVD events was similar across all quartiles of MVPA for men, ranging from 1.1±0.05 to 1.4±0.05 years.

Conclusions: The benefits of physical activity...
extend multiple decades into older ages. Even modest levels of physical activity during middle age is associated with longer CVD-free survival, particularly among women.


Funding: Yes

Funding Component: Midwest Affiliate (Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota & Wisconsin)

040

Association of Physical Inactivity and Lifetime Risk of Heart Failure Among White and Black US Adults

Sadiya S Khan, Amanda E. Paluch, Hongyan Ning, Northwestern Univ, Chicago, IL; Jarett D. Berry, UT Southwestern, Dallas, TX; Mercedes Carnethon, John T. Wilkins, Donald M. Lloyd-Jones, Northwestern Univ, Chicago, IL

Introduction: Adherence with the American Heart Association (AHA) guidelines for physical activity (AHA-PA) may reduce the risk of heart failure (HF). However, the association of AHA-PA in relation to sex and race-specific lifetime risk (LR) estimates of HF and years lived free of HF is not established. Therefore, we sought to examine the association of AHA-PA and burden of HF.

Methods: We included individual-level pooled data from 5 population-based cohorts and stratified middle-aged participants (index age 40-59 years) free of cardiovascular disease (CVD) and HF at baseline by sex and race. We categorized AHA-PA as ideal (≥150 minutes/week), intermediate (1 to 149 minutes/week), or poor (0 minutes/week) and performed (1) modified Kaplan-Meier analysis to estimate LR of HF, (2) Irwin restricted mean to estimates years lived free of and with HF, and (3) competing Cox models (adjusted for age, smoking, education, body mass index [BMI], hypertension, and diabetes) to estimate joint cumulative risks for HF or death. Results: Of the 41,685 participants, 19% were black and 82% were women. Over median follow-up of 13.8 years, LR for incident HF was higher in individuals with poor compared with those who achieved ideal AHA-PA among women and black men, but not white men. Poor AHA-PA was associated with significantly fewer healthy years lived free of HF among black men (~4.9 years) compared with ideal AHA-PA, but was not significantly different among black women or white adults. Adjusted competing hazard ratios for incident HF among middle-aged black men with poor AHA-PA was 1.39 (95% confidence interval 1.02, 1.90) compared with ideal AHA-PA, but was not significantly different among black women or white adults. Adjusted competing hazard ratios for incident HF among middle-aged black men with poor AHA-PA was 1.39 (95% confidence interval 1.02, 1.90) compared with ideal AHA-PA with similar findings among black (1.40 [1.07, 1.82]) or white women (1.79 [1.48, 2.17]) (Table). Discussion: Adherence with ideal AHA-PA is associated with lower risk of HF and greater proportion of life lived free of HF, particularly among black men. Public health policies promoting PA may mitigate the risk of HF in women and the racial disparities in HF in men.
Perceived and Objective Characteristics of the Neighborhood Environment Are Associated With Accelerometer Measured Sedentary Time and Physical Activity, the CARDIA Study

Kara M Whitaker, Qian Xiao, Univ of Iowa, Iowa City, IA; Kelley Pettee Gabriel, Univ of Texas Health Science Ctr at Houston, Austin, TX; Penny Gordon Larsen, Univ of North Carolina, Chapel Hill, NC; David R. Jacobs Jr., Univ of Minnesota, Minneapolis, MN; Stephen Sidney, Kaiser Permanente Northern California, Oakland, CA; Jared P. Reis, Natl Heart, Lung, and Blood Inst, Bethesda, MD; Bethany Barone Gibbs, Univ of Pittsburgh, Pittsburgh, PA; Barbara Sternfeld, Kaiser Permanente Northern California, Oakland, CA; Kiarri N. Kershaw, Northwestern Univ, Chicago, IL

Introduction: Growing evidence suggests that features of the neighborhood environment are associated with moderate to vigorous intensity physical activity (MVPA). Less is known about whether the neighborhood environment is associated with sedentary time (SED) or light-intensity physical activity (LPA), two emerging, independent risk factors for adverse health outcomes. Objective: To investigate the cross-sectional and longitudinal associations of perceived and objective characteristics of the neighborhood environment with accelerometer-measured SED, LPA, and MVPA.

Methods: Participants were 2,120 men and women from the Coronary Artery Risk Development in Young Adults (CARDIA) study who took part in the year 20 (2005-2006, aged 38-50 years) and year 30 exams (2015-2016, aged 48-60 years). Characteristics of the neighborhood environment assessed at year 20 included self-reported neighborhood cohesion, self-reported resources for physical activity, and objectively-measured neighborhood poverty and racial residential segregation using geocoded addresses linked to U.S. Census data. Physical activity was measured by accelerometer at year 20 in the full sample, and at year 30 in a sub-sample (n=892). Multivariable linear regression models examined cross-sectional associations of neighborhood measures at year 20 with SED, LPA, and MVPA, and 10-year changes in SED, LPA, and MVPA.

Results: In cross-sectional analyses, each one standard deviation increase in the neighborhood cohesion score was associated with 4.1 less SED minutes/day (95% CI: -8.0, -0.2, p=0.04), and 4.5 more LPA minutes/day (95% CI: 0.9, 8.0, p=0.01). Each one standard deviation increase in the neighborhood cohesion score was associated with 1.2 more MVPA minutes/day (95% CI: 0.1, 2.3, p=0.04). A one standard deviation increase in neighborhood poverty was associated with 11.1 less SED minutes/day (95% CI: -21.2, -1.2, p=0.03) and 10.6 more LPA minutes/day (95% CI: 1.8, 19.4, p=0.02), among black men only. None of the neighborhood characteristics were associated with 10-year changes in activity in the full study sample; however, each one standard deviation increase in the

Table: Adjusted Competing Hazard Ratios for First Event (HR or Death) Among Middle-aged Men and Women* (Index Age 40-59 years). According to the American Heart Association Guideline Recommendations for Physical Activity

<table>
<thead>
<tr>
<th>Variable</th>
<th>Men (0 minutes/week)</th>
<th>Inter (1 to 149 minutes/week)</th>
<th>Ideal (≥150 minutes/week)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Failure (HR)</td>
<td>1.02 (0.82, 1.28)</td>
<td>0.69 (0.69, 1.14)</td>
<td>1.00 (reference)</td>
</tr>
<tr>
<td>All-cause mortality (HR)</td>
<td>1.11 (0.54, 1.89)</td>
<td>0.50 (0.47, 1.10)</td>
<td>1.00 (reference)</td>
</tr>
</tbody>
</table>

*Individual-level data were pooled from 5 population-based cohorts including the Alcoholic Liver Disease and Cardiovascular Disease Study, Coronary Artery Risk Development in Young Adults Study, Cardiovascular Health Study, Multi-Ethnic Study of Atherosclerosis, and the Women's Health Initiative.

Adjusted for age, smoking, education, body mass index, hypertension, and diabetes.
neighborhood cohesion score was associated with a 10-year decrease of 25.4 SED minutes/day (95% CI: -46.7, -4.1, p=0.02) and a 10-year increase of 19.0 LPA minutes/day (95% CI: 1.9, 36.1, p=0.03), among black men only.

**Conclusions:** Higher neighborhood cohesion and resources were beneficially associated with accelerometer-measured activity in cross-sectional analyses; however, neighborhood characteristics did not associate with 10-year changes in activity. Differences were observed by race and sex, with more robust findings observed in black men for neighborhood poverty and cohesion.

Disclosures:  **K.M. Whitaker:** None.  **Q. Xiao:** None.  **K. Pettee Gabriel:** None.  **P. Gordon Larsen:** None.  **D.R. Jacobs:** None.  **S. Sidney:** None.  **J.P. Reis:** None.  **B. Barone Gibbs:** None.  **B. Sternfeld:** None.  **K.N. Kershaw:** None.

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**042**

**Accelerometer-Derived Daily Life Movement Classified by Machine-Learning and Incidence of Cardiovascular Disease in Older Women: The OPACH Study**

**Andrea Z. LaCroix,** UC San Diego, La Jolla, CA;  
John Bellettiere, UC San Diego, San Diego, CA;  
Chongzhi Di, Fred Hutchinson Cancer Res Ctr, Seattle, WA;  
Dori Rosenberg, Kaiser Permanente Washington Health Res Inst, Seattle, WA;  
Michael J. LaMonte, SUNY Buffalo, Buffalo, NY

**Background:** OPACH study evidence has shown that both accelerometer-measured light (LPA) and moderate-vigorous physical activity (MVPA) are associated with CVD mortality and morbidity in older women. However, accelerometer-measured PA exposures have been limited to measuring time and intensity of movement, without providing any information about which physical activity behaviors produced the movements. This study examines associations of a validated, machine-learned classification of “daily life movement” (DLM) in relation to incident CVD events.

**Methods:** Women (n=5416, mean age=79±7, 33% Black, 17% Hispanic) without prior myocardial infarction or stroke wore accelerometers for up to 7 days from May 2012-April 2014 and were followed for incident CVD through February 2018 (n=667 events). Machine-learned algorithms were developed in a sample of 39 free-living older women who simultaneously wore small cameras (SenseCam) capturing images of daily activities (used as the ground truth) and hip-worn accelerometers to measure movement. DLM was defined as standing and moving in a confined space such as around the house or garden. The DLM algorithm had 66% sensitivity and 94% specificity compared to SenseCam images and was further validated in 2 other populations. Cox models estimated hazard ratios (HR) and 95% confidence intervals for CVD across quartiles of DLM adjusting for age, race-ethnicity, smoking, alcohol use, education, co-morbidity score, physical function, and self-rated health. We then examined the DLM association with CVD after adjustment for MVPA.

**Results:** Fully-adjusted HRs (95% CIs) for CVD across DLM quartiles were: [Q1-ref 1.00; Q2 0.74 (0.60,0.91); Q3 0.76 (0.61,0.94); Q4 0.56 (0.44,0.72); p-trend<0.001]. Hazard ratios for continuous DLM show that associations were independent of MVPA (Figure).

**Conclusions:** Older women who spend more time in DLM had reduced risks of incident CVD. Increasing levels of DLM is an achievable behavioral target for reducing CVD risk in older women.
Disclosures: **A.Z. LaCroix**: None. **J. Bellettiere**: None. **C. Di**: None. **D. Rosenberg**: None. **M.J. LaMonte**: None.

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043

**Self-Identified Hispanic/Latino Dietary Identity is Differentially Associated With Diet Quality and Food Intake Across Ethnic Heritages in the Hispanic Community Health Study/Study on Latinos**

Josiemer Mattei, Martha Tamez, Harvard Chan Sch Public Health, Boston, MA; Daniela Sotres-Alvarez, Univ of North Carolina, Chapel Hill, NC; Anna Maria Siega-Riz, Univ of Virginia, Charlottesville, VA; Linda C Gallo, San Diego State Univ, San Diego, CA; Linda Van Horn, Northwestern Univ Feinberg Sch of Med, Chicago, IL; Martha Daviglus, Univ of Illinois, Chicago, IL; Denise C Vidot, Tali Elfassy, Univ of Miami, Miami, FL; Robert C Kaplan, Albert Einstein Coll of Med, Bronx, NY

Introduction: Characterizing the food intake and dietary quality of diverse Hispanics/Latinos remains challenging given the ethnic-specific sociocultural influences. A construct indicating self-identified dietary identity as traditional Hispanic/Latino versus US-American diet could help identify dietary preferences in this population.

Hypothesis: We hypothesized that 1) self-identified foods differed by identity status and country of origin (ethnic heritage), and 2) dietary identity was associated with higher diet quality among Hispanics/Latinos.

Methods: We used baseline data from the population-based Hispanic Community Health Study/Study of Latinos cohort of adults 18-74y (n=16,275). Dietary identity was self-assessed by rating foods usually consumed as more akin to Hispanic/Latino or to US-American in a scale of 1-5 (higher score denotes more US diet). Dietary intake was assessed with two 24-hour recalls. Diet quality was measured via the Alternate Healthy Eating Index (AHEI; range 0-110: higher score denotes higher quality). Linear regression models were run to estimate means of AHEI and its components adjusted for demographic, socioeconomic, acculturation, and behavioral factors. We estimated the proportional contribution of food groups to total energy intake using PROC RANK in SAS v9.4.

Results: Overall, 42.9% self-identified their diet as mostly Hispanic/Latino, 33.2% as mainly Hispanic/Latino, and 23.8% as equal or mostly/mainly US (last three categories combined as ‘slightly Hispanic/Latino’). AHEI did not differ by dietary identity in the overall cohort, but a significant interaction with heritage was detected (p<0.0001). Analyses by heritage found higher adjusted means (SE) of AHEI among Mexicans with mostly [51.9 (0.40)] and mainly [51.9 (0.40)] Hispanic/Latino dietary identity than slightly Hispanic/Latino [50.9 (0.41); p<0.001]; but lower AHEI among South Americans with mainly Hispanic/Latino dietary identity [47.6 (0.75)] than slightly Hispanic/Latino [49.2 (0.62); p<0.01]. In Mexicans, a mostly Hispanic/Latino dietary identity was associated with higher intake of whole grains, and nuts and legumes, and lower intake of sodium; while in Puerto Ricans, it was associated with higher intake of nuts and legumes and lower intake of vegetables without...
Differential Effects of Sugar-sweetened, Artificially Sweetened, and Unsweetened Beverages on Taste Preference but Not CVD Risk Factors in a 12-Month RCT

Cara B Ebbeling, Henry A Feldman, Sarah K Steltz, David S Ludwig, Boston Children’s Hosp, Boston, MA

Methods. Participants were adults aged 18 to 40 y who habitually consumed SSB. We randomly assigned 203 participants (121 males, 82 females) to three groups, and delivered SSB, ASB, or USB to their homes for 12 months. Outcomes included ratio of serum triglyceride to HDL-cholesterol (TG:HDLC, primary outcome), insulin sensitivity (HOMA-S), body weight, and fat mass (DXA). To assess preference for sweet taste, we obtained sweetness ratings for sucrose solutions ranging in concentration (mass/volume) from 0% to 18% using a 10-cm visual analog scale (0=not at all sweet; 10=extremely sweet). We fitted a logistic curve to each participant’s ratings, and defined sweetness threshold as the concentration corresponding to 5 cm on the scale.

Results. Participant retention was 92% (186 of 203). Consumption of assigned beverages increased by 1 to 2 servings/d (12 fl oz per serving) for each group (P<0.001), and consumption of SSB declined to almost 0 for those receiving ASB or USB. Neither TG:HDLC nor HOMA-S changed significantly for any group (P>0.20). Change in body weight did not differ between groups (P=0.65) despite observed weight gain with consumption of SSB (mean±SE 1.2±0.6 kg, P=0.03) but not with ASB or USB (both 0.6±0.6 kg, P>0.20). Consistent with an a priori hypothesis, we found effect modification by a measure of baseline adiposity (P=0.01). Body weight increased by 0.48±0.17 kg more for each kg of trunk fat with consumption of SSB vs. USB (P=0.005). The increase was 0.39±0.17 kg/kg with SSB vs. ASB (P=0.02). A similar pattern of effect modification was observed for change in fat mass. Change in sweetness threshold differed between groups (P=0.03), due to a decrease with consumption of USB (median -0.5%, interquartile range 1.3, P=0.005) and no change with SSB or ASB.

Conclusions. Replacing SSB with non-caloric beverages had no effect on pre-specified CVD risk factors. Among individuals with central adiposity, replacing SSB with either ASB or USB had a favorable effect on body weight,
consistent with prior findings. However, USB were a better replacement than ASB for altering taste preference, a finding with plausible implications for promoting adherence to prescribed low-sugar diets. Consistent with epidemiologic data, the benefits of eliminating consumption of SSB on CVD risk factors may require longer periods of study for the general population.

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**D.S. Ludwig:** None.

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045

**The Dose-Response Effect of a Mediterranean Style Diet With Lean Beef on Lipids and Lipoproteins**

**Jennifer Fleming,** Penn State Univ, University Pk, PA; Penny Kris-Etherton, Kristina Petersen, Penn State Univ, University Park, PA; David Baer, USDA, Beltsville, MD

A Mediterranean dietary pattern is widely recommended because of an extensive evidence base showing beneficial effects on cardiovascular disease (CVD) risk and mortality. The reduction in cardiovascular mortality is due, in part, to the improvements in lipids and lipoproteins versus a Western dietary pattern. Plant-based diets such as a Mediterranean diet are recommended for CVD risk reduction. However, adherence to plant-based diets is often hampered by the limited or restricted intake of red meat, a staple of the American diet. We conducted a multicenter, 4-period controlled feeding, randomized crossover study at Penn State University and USDA-Beltsville to evaluate the effects of a Mediterranean diet (CHO 42%, PRO 17%, FAT 41%, SFA 8%, MUFA 26%, PUFA 8%) with different quantities of lean beef (0.5, 2.5 and 5.5 oz/day) compared to an average American diet (AAD; CHO 52%, PRO 15%, FAT 33%, SFA 12%, MUFA 13%, PUFA 8%) on CVD risk factors. We tested the hypothesis that including 0.5, 2.5 or 5.5 oz/d (based on 2100 kcals) of lean beef in a healthy Mediterranean style diet will confer similar cardioprotective benefits, and be superior to an AAD. Each Mediterranean diet included 7oz. equivalents of protein, of which 0.5, 2.5 or 5.5 oz. came from beef and the remainder from fish, poultry, pork, nuts, eggs, and legumes. The quantities of beef reflect amounts consumed in a traditional Mediterranean diet (0.5 oz.), current consumption in the U.S. (2.5 oz.), and an amount that represents all animal protein equivalents (5.5 oz.). Participants (n=60; 30 per site) included generally healthy normal to overweight/obese males and females (BMI= 20-38 kg/m²) 30 to 60 years. Participants were randomized to each of the 4 diets for 4 weeks with an approximate 2-week break between treatments. Fasting blood samples were collected on two consecutive days at baseline (start of study) and at the end of each 4-week period. All three Mediterranean diets elicited similar lowering of total cholesterol (TC; p<0.0001), LDL-C (p<0.001), non-HDL-C (p<0.0001) and apolipoprotein B (apoB) (p<0.0001) that was greater than the AAD. All diets (AAD, MED0.5, MED2.5 and MED5.5) decreased HDL-C (-3.46 ± 1.11, -4.93 ± 1.14, -4.44 ± 0.93, and -3.31 ± 1.20 mg/dl, respectively; p<0.01) and apolipoprotein A1 (apoA1) (-8.63 ± 1.77, -11.45 ± 1.72, -11.21 ± 1.71, and -7.97 ± 1.90 mg/dl, respectively; p<0.0001). The MED5.5 attenuated the reduction in apoA1 versus the other two MED diets (p<0.05). In conclusion, a healthy Mediterranean Style diet containing 0.5 to 5.5 oz/day of lean beef improves multiple CVD risk factors compared to a current American dietary pattern.

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**K. Petersen:** None.  
**D. Baer:** B. Research Grant; Modest; Grant funded by the Beef Checkoff.
Longitudinal Associations of Omega-6 and Omega-3 Plasma Phospholipid Polyunsaturated Fatty Acids With Dementia in Older Adults: the Cardiovascular Health Study

Marcia C. de Oliveira Otto, The Univ of Texas Health Science Ctr at Houston, Houston, TX; Jason H. Wu, Univ of New South Wales, Sydney, Australia; Evan L. Thacker, Brigham Young Univ, Provo, UT; Heidi Lai, Tufts Univ, Boston, MA; Rozenn N. Lemaitre, Barbara McKnight, Univ of Washington, Seattle, WA; Nikhil Padhye, The Univ of Texas Health Science Ctr at Houston, Houston, TX; Xiaoling Song, Fred Hutchinson Cancer Res Ctr, Seattle, WA; Irena B. King, Univ of New Mexico, Albuquerque, NM; Oscar Lopez, Univ of Pittsburg, Pittsburg, PA; David Siscovick, New York Acad of Med, New York, NY; Dariush Mozaffarian, Tufts Univ, Boston, MA

Background: Polyunsaturated fatty acids (PUFA) are essential nutrients for normal brain function, constituting nearly 35% of brain lipids. Experimental studies suggest that omega-3 and omega-6 PUFA, present in plant foods and fish, may reduce risk of dementia. Most prior studies assessed self-reported estimates and used one baseline measure of objective PUFA biomarkers, which may lead to poor estimation of long-term risk. Aims: Investigate prospective associations of serial measures of plasma phospholipid omega-3 (ALA [18:3], EPA [20:5], DPA [22:5], DHA [22:6]) and omega-6 (LA [18:2], AA [20:4]) PUFA with risk of total dementia and dementia subtypes (Alzheimer’s Disease [AD] and vascular and mixed dementia [VaD]) in older adults in the Cardiovascular Health Study. Methods: Among 3,307 U.S. adults aged ≥65y and free of stroke, cognitive impairment or dementia at baseline, circulating levels were measured serially at baseline, 6 years and 13 years using standardized methods. Dementia was identified using neuropsychological tests or hospitalization records adjudicated by CHS Cognition Study investigators, and by ICD-9 codes from linked Medicare administrative data. Prospective associations were assessed by multivariate-adjusted Cox models incorporating time-varying fatty acid measures and covariates. 

Results: During 22,288 person-years of follow-up (1992-2015), 1,164 dementia cases were identified, with 530 AD and 256 VaD cases. After adjustment for demographic, lifestyle and dietary factors, higher circulating levels of AA were associated with lower risk of total dementia and AD (see Table). There were no statistically significant associations between circulating omega-3 PUFA or LA and incident dementia. Conclusion: In older adults, higher circulating AA was inversely associated with risk of total dementia and AD, but not other dementia subtypes. These findings highlight the need to identify mechanisms influencing circulating AA levels that could be effective for the prevention of dementia later in life.

D. Mozaffarian: Honoraria; Modest; ad hoc honoraria or consulting fees from GOED, DSM, Nutrition Impact, Pollock Communications, Bunge, Indigo Agriculture, Amarin, and America’s Test Kitchen. Honoraria; Significant; fees from Acasti Pharma. Consultant/Advisory Board; Modest; Omada Health. Consultant/Advisory Board; Significant; Elysium Health (with stock options) and DayTwo. Other; Modest; patents US8889739 and US9987243 to Tufts University (unlicensed), listing Dr. Mozaffarian as a co-inventor, for use of trans-palmitoleic acid to prevent and treat insulin resistance, type 2 diabetes, chapter royalties from UpToDate.

Funding: No

Funding Component:

21

Lipid Metabolites Are Associated With Epigenetic Aging Acceleration in the Coronary Artery Risk Development in Young Adults (CARDIA) Study

Tao Gao, Yinan Zheng, Brian Joyce, John Wilkins, Philip Greenland, Donald Lloyd-Jones, Lifang Hou, Northwestern Univ, Chicago, IL

Background: Epigenetic aging measures including phenotypic aging (PA) and extrinsic epigenetic age acceleration (EEAA) have been associated with age-related diseases and conditions that include cardiovascular diseases, diabetes, and cancer. However, associations between epigenetic aging and lipids have not been widely investigated. Hypothesis: We hypothesized that adverse lipid metabolite profiles are associated with epigenetic age acceleration. Methods: We estimated measures of epigenetic age acceleration in 957 white and black participants from the CARDIA Study with whole-genome blood DNA methylation profiling by the Illumina EPIC array at Year 20 (Y20; ages 38-52). We used separate linear regression models to examine cross-sectional associations of PA and EEAA estimates with fasting triglyceride (TG), low-density lipoprotein cholesterol (LDL-C) and high-density lipoprotein cholesterol (HDL-C) levels after adjusting for race, sex, education, alcohol intake, smoking status and physical activity. Results: Participants were 51% female (n=490) and 39% black (n=393) with mean chronological age 45±4 years. Compared with participants in the 1st tertile of TG, those in the 2nd tertile had 1.32 years older PA (95%CI 0.33-2.30) and 1.04 years older EEAA (95%CI 0.22-1.87); those in the 3rd tertile had 1.78 years older PA (95%CI 0.75-2.81) and 1.09 years older EEAA (95%CI 0.23-1.95). Compared to participants in the 1st tertile of HDL-C, those in the 3rd tertile had decreased EEAA by 1.21 years (95%CI -2.16--0.27). There were no significant differences of PA or EEAA among participants of LDL-C tertiles. Conclusions: Adverse lipid metabolites (TG and HDL-C) are associated cross-sectionally with accelerated epigenetic aging. Further studies are needed to understand the longitudinal associations between epigenetic aging and adverse lipid profiles as well as the potential mechanisms that underlie these associations.


Funding: Yes

Funding Component: National Center
Cardiovascular Health Behavior and Health Factor Trends (1999-2014) and Projections to 2050: Results From the National Health and Nutrition Examination Surveys

Sadiya S Khan, Nilay S. Shah, Hongyan Ning, Darwin R. Labarthe, Mark D. Huffman, Joshua D. Bundy, Northwestern Univ, Chicago, IL; Martin O’Flaherty, Simon Capewell, Univ of Liverpool, Liverpool, United Kingdom; Donald M. Lloyd-Jones, Northwestern Univ, Chicago, IL

Introduction: Cardiovascular disease (CVD) death rates have plateaued. Hence, strategic targets to achieve reduction in CVD death rates set by the American Heart Association (20% by 2020) and others are at risk. Public health initiatives are urgently needed to refocus prevention of CVD in terms of cardiovascular health (CVH) and reduce disparities in CVH. Therefore, we sought to describe US CVH trends from 1999-2014 and forecast to 2050.

Methods: We included a representative sample of 39,835 cardiovascular disease-free, non-institutionalized US adults aged ≥20 years. We calculated population prevalence of ideal, intermediate, and poor health behaviors (smoking, diet, physical activity, and body mass index) and health factors (glucose, cholesterol, and blood pressure) and individual-level composite CVH score including all 7 metrics (0-14 points) by sex, race/ethnicity, and education level as a proxy for socioeconomic status. We created forecasts to 2030 and 2050 assuming that observed trends might continue in a linear fashion. Results: Improvements from 1999-2014 in population levels of ideal blood pressure (29 to 38%) and cholesterol (43 to 50%) have been offset by declines in prevalence of ideal body weight (33 to 25%) and glucose (61 to 48%) in men with similar patterns in women and across race and education. Mean CVH score is projected to decline in all adults (men [7.9→6.8], women [7.5→6.8], blacks [7.1→6.0], whites [7.6→6.8], high school education or less [7.1→6.3], and some college education or more [7.9→6.8]) from 2013-2014 to 2050. The figure shows population prevalence by education level of poor, intermediate, and ideal levels of CVH metrics in 2013-2014 and projected prevalence for 2030 and 2050. Discussion: Encouraging progress in cholesterol and blood pressure in recent decades has been negated by persistent disparities and declines in composite CVH. The sobering predictions for 2030 and beyond highlight an urgent need for more effective prevention policies for equitable achievement of ideal CVH.


Funding: No
**Introduction:** Trimethylamine-N-oxide (TMAO), a diet-derived, gut microbial-host co-metabolite, has been associated with adverse cardiovascular outcomes in patient populations. However, the evidence is lacking from prospective studies conducted in general populations and in non-Western populations.

**Hypothesis:** TMAO level is associated with risk of coronary heart disease (CHD) in general populations. **Methods:** We examined associations of urinary TMAO and its precursors (i.e., choline, betaine, and carnitine) with risk of CHD in a case-control study nested within two prospective cohorts of Chinese adults, including 275 incident CHD cases and 275 individually matched controls. **Results:** Urinary TMAO, but not its precursors, was associated with risk of CHD. Odds ratio (OR, 95% CI) for the highest vs. lowest quartiles of TMAO was 1.91 (1.08-3.35; \( p \)-trend=0.008) after adjusting for CHD risk factors including obesity, diet, lifestyles, and metabolic diseases and 1.75 (0.96-3.18; \( p \)-trend=0.03) after further adjusting for potential confounders/mediators including central obesity, dyslipidemia, low-grade inflammation, and intakes of seafood and deep-fried meat/fish, which were associated with TMAO level in our study. OR was 1.30 (1.03-1.63) per standard deviation increase in log-TMAO in the fully-adjusted model. **Conclusions:** Our study suggests that TMAO may play a role in the development of CHD, highlighting the importance of diet-gut microbiota-host interplay in cardiometabolic health.

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**Funding:** No

**Funding Component:**

**MP03**

Aortic Stiffening and Intracranial Atherosclerosis: The Atherosclerosis Risk in Communities Neurocognitive Study (ARIC-NCS)

**Priya Palta,** Columbia Univ, New York, NY; **Ye Qiao,** Johns Hopkins Univ Sch of Med, Baltimore, MD; **Jingkai Wei,** Michelle Meyer, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; **Hiro Tanaka,** Univ of Texas at Austin, Austin, TX; **David Knopman,** Mayo Clinic, Rochester, MN; **Gerardo Heiss,** Univ of North Carolina at Chapel Hill, Chapel Hill, NC; **Bruce Wasserman,** Johns Hopkins Univ Sch of Med, Baltimore, MD

**Introduction:** Stiffening of the aorta is associated with increased pulse pressure and transmission of pulsatile energy into the cerebral circulation. An association between increased aortic stiffening with intracranial atherosclerotic disease (ICAD) has not been widely studied. We tested the hypothesis that loss of aortic elasticity (i.e. higher aortic stiffness) is associated with a higher presence of ICAD. **Methods:** ARIC-NCS participants (n=1412;
Mean age: 76 years; 42% male; 30% Black) with measures of aortic stiffness and vascular brain magnetic resonance imaging (MRI) at the visit 5 (2011-2013) examination were included. Aortic stiffness was measured by carotid-femoral pulse wave velocity (cfPWV) using the VP-1000 Plus device (Omron Co., Japan). cfPWV was discretized into high vs. low aortic stiffness based on the upper 25th percentile, 13.4 m/s. Brain MRI was performed on 3.0 Tesla scanners using a standardized protocol that included an MR angiography (MRA) and high isotropic resolution vessel MRI. Presence of ICAD was defined as eccentric wall thickening with or without luminal stenosis on MRA. We first examined the functional form relationship between continuous measures of cfPWV and ICAD. Comparing those with high vs. low aortic stiffening, we estimated the prevalence odds of ICAD using logistic regression. Models were adjusted for age, sex, race-center, education, smoking, heart rate, blood-pressure lowering medication, diabetes, LDL-cholesterol, and minutes/week of physical activity. Sampling weights were used for generalizability to the full ARIC cohort at visit 5. We tested for effect modification by race, sex, diabetes, central systolic blood pressure, and use of blood pressure-lowering medication. Results: The mean cfPWV was higher among participants with ICAD (12.6 ± 3.2 m/s) compared to those without ICAD (11.2 ± 2.9 m/s). cfPWV was associated with ICAD in a monotonic, linear fashion (p<0.05). The presence of ICAD was 50.6% among participants with high aortic stiffness (cfPWV above the upper 25th percentile; n=354) compared to 30.2% among participants with low aortic stiffness (n=1058). Compared to participants with low aortic stiffness, those with high aortic stiffness had two-fold higher odds of ICAD (odds ratio (OR): 1.97, 95% confidence interval (CI): 1.68, 2.33). No statistically significant modification of this association was observed. Results were robust to exclusions for prevalent stroke (n=43) and prevalent cardiovascular disease (n=153). Conclusions: Aortic stiffness, a highly prevalent trait among older men and women, is associated with ICAD presence quantified by magnetic resonance angiography. Aortic stiffness, its risk factors and the factors associated with the preservation of aortic elasticity, may play a role in modifying the risk of intracranial atherosclerosis.


Funding: No

Funding Component:

MP04

Mean Heart Rate and Brain Morphology in Elderly Women Without a History of Cardiovascular Disease

Bernhard Haring, Univ of Würzburg, Würzburg, Germany; Jingmin Liu, Women’s Health Initiative Coordinating Ctr, Seattle, WA; Daijchi Shimbo, Columbia Univ Medical Ctr, New York, NY; Claudia B. Padula, Stanford Neurosciences Inst, Palo Alto, CA; Wenjun Li, Univ of Massachusetts, Worcester, MA; Khyobeni Mozhui, The Univ of Tennessee, Memphis, TN; Steve Rapp, Mark Espeland, Wake Forest Sch of Med, Winston-Salem, NC; Sylvia Wassertheil-Smoller, Albert Einstein Coll of Med, New York, NY

Background
Low resting heart rate (RHR) has been shown to be predictive of a lower risk for cardiovascular events. Accumulating evidence suggests that RHR may also be related to cognition later in life. To this point, data on the relationship with brain morphology in populations with none or few modifiable cardiovascular risk factors are largely missing. The aim of this study was to assess the associations between mean RHR and brain volumes in elderly postmenopausal women without a history of cardiovascular disease.
Methods
The study sample consisted of postmenopausal women without a history of diabetes, coronary heart disease, stroke, atrial fibrillation and hypertension who were enrolled in the MRI ancillary study of the Women’s Health Initiative Memory Study (WHIMS-MRI). Women with very low (<40 bpm) or very high (>120 bpm) heart rate, suffering from any cancer, emphysema, history of pulmonary embolism or current smokers were excluded. Heart rate readings were taken at baseline (WHI enrollment, 1996-1998) and each annual follow-up visit. Brain MRI scans were performed between 2004-2006. Our final sample consisted of 493 women with a mean age of 69 years who were followed over a median of 8 years with an average of 8 RHR assessments.

Results
In multivariate regression models adjusting for age, education, WHI Hormone Trial Randomization assignment (HTR arm), depression, physical activity, alcohol intake, coffee intake, presence of ApoE4 allele, mean systolic blood pressure over time, antihypertensive medication use over time and incident cardiovascular disease over time, women in the highest tertile of mean RHR (71-92/min) exhibited significantly higher lesion volumes compared to women in the lowest tertile (51-66/min).

Conclusion
In postmenopausal women without a history of cardiovascular disease, high mean RHR was associated with higher white and grey matter lesion volumes later in life reflecting higher volumes of neuronal dysfunction and degeneration.


Funding: No

Funding Component:

MP05

Genetic Predisposition to Obesity and Healthful Plant-Based Diet in Risks of Hypertension and Cardiovascular Disease: Gene-Diet Interaction Analyses in the UK Biobank

Yoriko Heianza, Tao Zhou, Dianjianyi Sun, Tulane Univ, New Orleans, LA; Lu Qi, Harvard T.H. Chan Sch of Public Health; Tulane Univ, New Orleans, LA

Introduction: Plant-based diets include beneficial nutrients for the prevention of obesity and cardiovascular disease (CVD). No study has assessed interactions between a new healthful plant-based diet index (hPDI) and genetic predisposition to obesity in relation to adiposity and its related metabolic abnormalities.

Hypothesis: We assessed the hypothesis that adherence to healthy plant-based diets would modify the genetic risk of obesity, and people at genetically higher risk of obesity would be more susceptible to the healthy diets for improving obesity and cardiovascular health.

Methods: This study included 160184 participants initially free of CVD (myocardial infarction or stroke), diabetes, and cancer. We calculated the hPDI in which healthy plant foods received positive scores and the other foods received negative scores based on previous studies. A genetic risk score (GRS) of obesity was created based on 75 SNPs for BMI. Outcome measures included differences in BMI and mean arterial blood pressure (MAB), untreated hypertension (systolic blood pressure ≥130 mmHg, diastolic blood pressure ≥80 mmHg without antihypertensive medication use), and the 5-year incidence of CVD.

Table: Mean Heart Rate over time and lesion volumes in WHIMS-MRI Trial (n=956)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>RHR (beats/min)</th>
<th>Mean lesion volume (mm^3)</th>
<th>Mean white matter lesion volume (mm^3)</th>
<th>Mean grey matter lesion volume (mm^3)</th>
<th>Mean total lesion volume (mm^3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-39</td>
<td>75-104</td>
<td>70.8</td>
<td>73.0</td>
<td>73.9</td>
<td>73.9</td>
</tr>
<tr>
<td>40-49</td>
<td>75-104</td>
<td>74.0</td>
<td>75.0</td>
<td>75.9</td>
<td>75.9</td>
</tr>
<tr>
<td>50-59</td>
<td>75-104</td>
<td>74.0</td>
<td>75.0</td>
<td>75.9</td>
<td>75.9</td>
</tr>
<tr>
<td>60-69</td>
<td>75-104</td>
<td>74.0</td>
<td>75.0</td>
<td>75.9</td>
<td>75.9</td>
</tr>
<tr>
<td>70-79</td>
<td>75-104</td>
<td>74.0</td>
<td>75.0</td>
<td>75.9</td>
<td>75.9</td>
</tr>
<tr>
<td>≥80</td>
<td>75-104</td>
<td>74.0</td>
<td>75.0</td>
<td>75.9</td>
<td>75.9</td>
</tr>
</tbody>
</table>

Notes: *p-value; **p-value adjusted for covariates: age, education, WHI Hormone Trial Randomization assignment (HTR arm), depression, alcohol intake, coffee intake, presence of ApoE4 allele, mean systolic blood pressure over time, and antihypertensive medication use over time and baseline cardiovascular disease.

Funding: None. K. Mozhui: None. S. Rapp: None. M. Espeland: None. S. Wassertheil-Smoller: None.

Funding Component:

MP05

Genetic Predisposition to Obesity and Healthful Plant-Based Diet in Risks of Hypertension and Cardiovascular Disease: Gene-Diet Interaction Analyses in the UK Biobank

Yoriko Heianza, Tao Zhou, Dianjianyi Sun, Tulane Univ, New Orleans, LA; Lu Qi, Harvard T.H. Chan Sch of Public Health; Tulane Univ, New Orleans, LA

Introduction: Plant-based diets include beneficial nutrients for the prevention of obesity and cardiovascular disease (CVD). No study has assessed interactions between a new healthful plant-based diet index (hPDI) and genetic predisposition to obesity in relation to adiposity and its related metabolic abnormalities.

Hypothesis: We assessed the hypothesis that adherence to healthy plant-based diets would modify the genetic risk of obesity, and people at genetically higher risk of obesity would be more susceptible to the healthy diets for improving obesity and cardiovascular health.

Methods: This study included 160184 participants initially free of CVD (myocardial infarction or stroke), diabetes, and cancer. We calculated the hPDI in which healthy plant foods received positive scores and the other foods received negative scores based on previous studies. A genetic risk score (GRS) of obesity was created based on 75 SNPs for BMI. Outcome measures included differences in BMI and mean arterial blood pressure (MAB), untreated hypertension (systolic blood pressure ≥130 mmHg, diastolic blood pressure ≥80 mmHg without antihypertensive medication use), and the 5-year incidence of CVD.
Results: Higher hPDI was related to lower risks of obesity and untreated hypertension among the total study participants. We found a significant interaction between GRS and hPDI for BMI (Pinteraction <0.0001) (Fig. panel A). For people at genetically high risk, higher hPDI was more strongly associated with lower BMI levels. The significant GRS-hPDI interaction was also found for MAB levels and the risk of untreated hypertension (panels B and C). The effect of GRS-hPDI interaction was also related to the subsequent risk of CVD (Fig. panel D).

Conclusions: Adherence to the healthy plant-based dietary pattern significantly attenuated genetic association with obesity. People at genetically higher risk of obesity may be more susceptible to benefits of healthy plant-based diets in improving adiposity and cardiovascular health.

Introduction: A role for vitamin K in CVD has been proposed because vitamin K-dependent proteins are present in vascular tissue. In individual cohorts, low vitamin K status has been associated with increased CVD. We conducted a participant-level meta-analysis to summarize the association between circulating vitamin K and CVD in the Framingham Offspring Study, the Health, Aging, and Body Composition Study (Health ABC), and the Multi-ethnic Study of Atherosclerosis (MESA), three cohorts in which circulating vitamin K measures and confirmed cardiovascular events are available.

Aim: To determine the association between vitamin K status and CVD in community-dwelling adults, overall and according to CVD risk and known risk factors.

Methods: Circulating phylloquinone (vitamin K1) was measured from baseline fasting blood samples in 3626 participants and categorized as ≤0.5 nM, >0.5 - ≤1.0 nM and >1.0 nM. Multivariable Cox proportional hazards models assessed the association between circulating phylloquinone and risk of a composite of CVD and mortality.

Results: Among the 3626 participants, mean baseline age was 65±11 yrs; 45% were men and 65% white. There were 1436 composite events over a median of 15.4 years. Participants with circulating phylloquinone < 0.5 nM had a 21% higher risk for CVD and mortality compared to those with >1.0 nM [HR(95%CI)=1.21(1.06, 1.38)]. When stratified according to baseline CVD risk and risk factors, those with circulating phylloquinone < 0.5 nM had a 27%-82% higher risk for CVD and mortality outcomes compared...
to those with >1.0 nM (Table).  

**Conclusion:** Lower circulating phylloquinone was independently associated with a higher risk for CVD and mortality in community-dwelling adults, and more so among those at risk for CVD. Additional studies are needed to confirm our findings and clarify if segments of the population can derive cardiovascular benefit from improving vitamin K status.

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### Table: Hazard ratios (95% confidence intervals) for incident CVD and mortality associated with circulating phylloquinone overall and according to baseline CVD risk status

<table>
<thead>
<tr>
<th>Circulating phylloquinone (μg/L)</th>
<th>&lt;1.0 nM</th>
<th>1.0–1.9 nM</th>
<th>≥2.0 nM</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall (n= 3060)</td>
<td>1.35 (1.10–1.55)</td>
<td>1.09 (0.89–1.34)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>Framingham Risk Score 0%–20% (n=1675)</td>
<td>1.35 (1.10–1.68)</td>
<td>1.09 (0.89–1.34)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>20%–40% (n=1257)</td>
<td>1.21 (0.95–1.55)</td>
<td>1.06 (0.84–1.37)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>40%–60% (n=1213)</td>
<td>1.35 (1.10–1.68)</td>
<td>1.09 (0.89–1.34)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>Hypertension (present for Yes (n=1371)</td>
<td>1.35 (1.10–1.68)</td>
<td>1.09 (0.89–1.34)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>No (n=2212)</td>
<td>1.11 (0.93–1.33)</td>
<td>1.00 (0.81–1.23)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>Diabetes (present for Yes (n=291)</td>
<td>1.35 (1.10–1.68)</td>
<td>1.09 (0.89–1.34)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>No (n=3171)</td>
<td>1.11 (0.93–1.33)</td>
<td>1.00 (0.81–1.23)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>Hypothyroidism (present for Yes (n=591)</td>
<td>1.35 (1.10–1.68)</td>
<td>1.09 (0.89–1.34)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>No (n=3171)</td>
<td>1.11 (0.93–1.33)</td>
<td>1.00 (0.81–1.23)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>BMI (≥25 vs &lt;25 kg/m²) (n=1036)</td>
<td>1.09 (0.89–1.34)</td>
<td>1.00 (0.81–1.23)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>25–29.9 kg/m² (n=1257)</td>
<td>1.11 (0.93–1.33)</td>
<td>1.00 (0.81–1.23)</td>
<td>reference</td>
<td></td>
</tr>
<tr>
<td>&lt;25 kg/m² (n=1897)</td>
<td>1.35 (1.10–1.68)</td>
<td>1.09 (0.89–1.34)</td>
<td>reference</td>
<td></td>
</tr>
</tbody>
</table>

Covariates: age, sex, race, income, educational attainment, body mass index, physical activity, smoking status, diabetes duration, alcohol use, hypertension, diabetes medication use, lipid lowering medication use, anti-inflammatory medication use, smoking status, alcohol use, dietary adherence, study, calendar year.

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### Funding: No

### Funding Component:

**MP07**

**The Association of Optimism, Chronic Kidney Disease and Rapid Kidney Function Decline Among African Americans in the Jackson Heart Study**

**La'Shaunta' Glover,** Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Loretta Cain, Crystal Butler, Univ of Mississippi Medical Ctr, Jackson, MS; Allana Forde, Drexel Univ, Philadelphia, PA; Tanjala Purnell, Johns Hopkins, Baltimore, MD; Bessie Young, Univ of Washington, Seattle, WA; Mario Sims, Univ of Mississippi Medical Ctr, Jackson, MS

**Background:** The burden of chronic kidney disease (CKD) and incidence of end-stage renal disease are greater among African Americans than other racial and ethnic groups. A number of studies have attributed the higher prevalence of CKD to traditional risk factors and lower socioeconomic status. However, few studies have examined the association of kidney disease with dispositional optimism, the expectation that positive things will happen.

**Hypothesis:** We hypothesize that there would be an inverse association between optimism and CKD and RKFD. **Objective:** To examine the association of optimism with CKD at baseline (2000-2004) and rapid kidney function decline (RKFD) between exams 1 and 3 (2000-2013) among African Americans. **Methods:** We examined 5292 African American participants from the Jackson Heart Study. Optimism was measured using the 6-item Life Orientation Test-Revised (LOT-R) scale and was categorized into tertiles. CKD at baseline was defined as the presence of albuminuria or reduced glomerular filtration rate (eGFR) <60 ml/min/1.73m², or report of dialysis at baseline examination. RKFD was defined as a decline > 4 ml/min/1.73m²/year between exams 1 and 3. The associations between optimism and kidney outcomes were tested using multivariable logistic regression to obtain odds ratios (OR) and 95% confidence intervals (CI), adjusting for age, sex, education, income, waist circumference, alcohol intake, physical activity, smoking, diabetes, and hypertension. **Results:** After exclusion of missing CKD status, there were 682/3422 (19.9%) cases of CKD at exam 1 and 303/3706 (8.2%) who had RKFD at exam 3. Participants with CKD and RKFD were less optimistic (p <0.05) and were more likely to be older, less educated, have a higher waist circumference, a higher diabetes prevalence. After full adjustment, high (vs. low) optimism was associated with a 42% lower odds of CKD (OR 0.58, 95% CI 0.34–0.96) and were more likely to be older, less educated, have a higher waist circumference, a higher diabetes prevalence. After full adjustment, high (vs. low) optimism was associated with a 32% lower odds of CKD (OR 0.68, 95% CI 0.53–0.85). After 7.21 median years of follow up, high (vs. low) baseline optimism was associated with a 33% lower odds of RKFD after full adjustment (OR 0.67 95% CI 0.48-0.95). **Conclusions:** Higher optimism was
associated with a lower odds of CKD and a lower odds of RKFD over a period of 7 years in this sample of African Americans.


Funding: No

Funding Component:

**MP08**

**Higher Fitness Level and Favorable Hemodynamic Responses to Submaximal Exercise Test in Young Adults are Associated With Lower Risk of Chronic Kidney Disease in Later Life: The Framingham Heart Study**

Joowon Lee, Vanessa Xanthikis, Boston Univ Sch of Med, Boston, MA; Rebecca Song, Boston Univ Sch of Public Health, Boston, MA; Ramachandran S Vasan, Boston Univ Sch of Med, Boston, MA

Introduction  Studies have demonstrated that higher cardiorespiratory fitness (CRF) and a favorable heart rate (HR) and blood pressure (BP) response to submaximal exercise, including during the recovery period, are associated with lower cardiovascular disease (CVD) risk. However, there are limited studies examining the association of CRF and hemodynamic response to exercise test with incidence of chronic kidney disease (CKD). Hypothesis  We hypothesized that high CRF and a favorable HR and BP response to submaximal exercise test and during recovery will be associated with lower risk of CKD prospectively. Methods  We evaluated 3,535 Framingham Offspring Study participants (mean age 43.5 yrs, 52.1% women) without CKD, who completed a submaximal exercise test between 1979-1983. CKD incidence was defined as eGFR <60ml/min/1.73m² on follow-up. Multivariable-adjusted Cox regression models with discrete time intervals were used to relate CRF and hemodynamic responses to exercise test at baseline with the incidence of CKD on follow-up. Results  At baseline, 23% of participants had chronotropic incompetence and 19.6% had impaired HR recovery after exercise (Δ HR < 12 bpm). On follow-up (median 25.7 years), 801 individuals (22.8%; 434 women) developed CKD. Participants in the second and third tertile of CRF (defined based on age and sex-specific treadmill exercise duration) had lower risk of CKD compared to those in the first tertile of CRF (Table). Participants with chronotropic incompetence, higher peak SBP during exercise and impaired HR recovery had higher risk of CKD, compared to those with chronotropic competence, lower peak SBP during exercise, and normal HR recovery post-exercise (Table). Conclusions  Higher CRF and favorable HR and BP responses to exercise test in young adulthood may be a marker of lower risk of CKD in later life. The biological mechanisms underlying the observed association warrant further investigation.

<table>
<thead>
<tr>
<th>Exercise variables modeled</th>
<th>Exercise variables modeled jointly*</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRF tertile 2</td>
<td>0.78 (0.64-0.95)</td>
</tr>
<tr>
<td>CRF tertile 3</td>
<td>0.78 (0.62-0.97)</td>
</tr>
<tr>
<td>Chronotropic incompetence</td>
<td>1.26 (1.00-1.57)</td>
</tr>
<tr>
<td>Impaired HR recovery</td>
<td>1.35 (1.12-1.63)</td>
</tr>
<tr>
<td>SBPmax (per 1 SD increment)</td>
<td>1.35 (1.00-1.83)</td>
</tr>
</tbody>
</table>

Abbreviations: CRF, cardiorespiratory fitness; CKD, chronic kidney disease; HR, Framingham Heart Study; CVD, cardiovascular disease; BMI, body mass index; SPRINT, Systolic Blood Pressure Intervention Trial; eGFR, estimated glomerular filtration rate; HR, heart rate; SBP, systolic blood pressure; SBPmax, peak SBP; β, standardized regression coefficient; p-value, probability value; α, p-value ≤ 0.05; β, p-value ≤ 0.10; *The model was adjusted for age, sex, smoking status, systolic BP, and BMI.

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Funding Component:

**MP09**

**Indices of Kidney Tubular Health Improve Cardiovascular Disease Risk Prediction in Adults With Hypertension and Chronic Kidney Disease in SPRINT**
Alexandra K. Lee, Univ of California, San Francisco, San Francisco, CA; Ronit Katz, Univ of Washington, Seattle, WA; Walter T Ambrosius, Wake Forest Univ, Winston-Salem, NC; Alfred K Cheung, Univ of Utah, Salt Lake City, UT; Pranav Garimella, Univ of California, San Diego, San Diego, CA; Lisa H Gren, Univ of Utah, Salt Lake City, UT; Vasantha Jotwani, Univ of California, San Francisco, San Francisco, CA; Javier A Neyra, Univ of Texas Southwestern Medical Ctr, Dallas, TX; Henry Punzi, Punzi Medical Ctr, Carrollton, TX; Kalani Raphael, Univ of Utah, Salt Lake City, UT; Joachim H Ix, Univ of California, San Diego, San Diego, CA; Michael Shlipak, Univ of California, San Francisco, San Francisco, CA

Introduction: While chronic kidney disease (CKD) is a strong risk factor for cardiovascular disease (CVD), traditional metrics of kidney function (eGFR and albuminuria) have not improved CVD risk prediction equations. We hypothesize that new measures of kidney tubular function and injury can improve CVD risk prediction.

Methods: Of 1971 SPRINT participants with eGFR <60mL/min/1.73m² and without CVD at baseline, we analyzed 1858 with urine and serum biomarkers. We conducted factor analysis on 10 kidney tubule biomarkers using principal-component factor estimation and promax rotation. To examine the association between the factor scores and risk of subsequent cardiovascular events, we used adjusted Cox models. Using Harrell’s C-statistic, we compared a standard CVD risk prediction model to models adding 1) factor scores of kidney tubular health, 2) eGFR and albumin-to-creatinine ratio (ACR), and 3) factor scores, eGFR and ACR. We also conducted these comparisons using ASCVD predicted risk in place of CVD risk factors among those <80 years.

Results: Mean age was 73, 44% female, 29% black, and mean±SD eGFR was 45±12 mL/min/1.73m². Factor analysis identified 4 unique dimensions of kidney tubular health that correspond to hypothesized physiologic processes (Table). Three of four factors were associated with CVD in demographic models, and Factors 3 and 4 remained associated in the full model. The C-statistic of the base CVD risk equation was 0.670, and with inclusion of the four kidney tubule factors the C-statistic improved to 0.727 (p for difference <0.0001), a larger increase than addition of eGFR and ACR to the base model (c=0.711, p for difference=0.0007). Addition of eGFR and ACR to the kidney tubule model did not improve discrimination (c=0.730, p for difference=0.17). Results were similar with ASCVD predicted risk.

Conclusion: Indices of kidney tubular health based on urine and serum biomarkers may improve CVD risk prediction in adults with hypertensive CKD. Further studies are needed in the general, non-CKD population.


Funding: No

Funding Component: MP10

Discontinuation of Angiotensin Converting Enzyme Inhibitors and Angiotensin Receptor Blockers in Chronic Kidney Disease
Introduction: Angiotensin Converting Enzyme Inhibitors and Angiotensin Receptor Blockers (ACE-I/ARB) are commonly used antihypertensives, especially preferred when albuminuria is present. Common reasons for discontinuing ACE-I/ARB include hyperkalemia and acute kidney injury (AKI). We assessed real-world practice patterns of discontinuing ACE-I/ARB in the setting of chronic kidney disease (CKD).

Hypothesis: Patients with more advanced CKD stage are more likely to discontinue ACE-I/ARB.

Methods: We identified incident users of ACE-I/ARB from the Geisinger Health System between 2004 and 2015, with a baseline estimated glomerular filtration rate ≥15 mL/min/1.73 m² and no previous diagnosis of end stage renal disease. Discontinuation was defined as a therapy gap ≥60 days. Kaplan Meier curves were used to depict time to discontinuation since initiating ACE-I/ARB by CKD stage (i.e. G1, G2, G3a, G3b, and G4) (Figure). Multivariable Cox proportional hazards models were constructed to quantify the association between discontinuation and CKD stage, captured both as baseline and time-dependent.

Results: 54,588 patients met inclusion criteria. Adjusted hazard ratios (HR) of discontinuation were 1.06 [95% confidence interval (CI): 1.03-1.09], 1.24 [1.19-1.30], 1.49 [1.40-1.59], and 2.31 [2.09-2.57], comparing baseline G2-G4 respectively with G1. Effects were stronger when G-stage was treated as time-dependent. In adjusted analysis, risk of discontinuation was higher in 2008-2011 (HR=1.16 [95% CI 1.13-1.19]) and 2012-2015 (HR=1.28 [1.24-1.32]) than 2004-2007. Hospitalizations related and not related to AKI were both associated with higher risks of discontinuation (HR=17.34 [95% CI 16.01-18.78], and 4.11 [3.94-4.30], respectively). Among 29,029 discontinued users, 6,187 (21.3%) restarted therapy within six months of discontinuation.

Conclusions: More advanced CKD stage was associated with a higher risk of ACE-I/ARB discontinuation with a trend toward greater discontinuation in more recent years.

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Funding Component:

MP11

Role of Modifiable and Non-Modifiable Risk Factors in the Association of Kidney Function With Dementia Incidence in Multi-Ethnic Study of Atherosclerosis (MESA)
Sanaz Sedaghat, Dept of Preventive Med, Northwestern Univ, Chicago, IL; Michael Bancks, Dept of Epidemiology and Prevention, Wake Forest Sch of Med, Winston-Salem, NC; Ian H. de Boer, Dept of Med, Univ of Washington, Seattle, WA; Holly Kramer, Div of Nephrology and Hypertension, Loyola Univ Chicago, Maywood, IL; Orlando Gutierrez, Depts of Med and Epidemiology Univ of Alabama at Birmingham, Birmingham, AL; WT Longstreth, Jr, Depts of Neurology and Epidemiology, Univ of Washington, Seattle, WA; Kiarri N. Kershaw, Mercedes Carnethon, Dept of Preventive Med, Northwestern Univ, Chicago, IL

Introduction- As many as 20-50% of persons with chronic kidney disease have mild-to-moderate cognitive impairment or overt dementia. Shared risk factors, such as aging, sex, hypertension, and diabetes have been suggested to play a role in this association. Our objective was to examine the contribution of non-modifiable and modifiable risk factors to this association.

Hypothesis- We hypothesize that non-modifiable and modifiable risk factors could explain part, but not all, of the association between worse kidney function with incidence of dementia.

Methods- We included 6025 CVD free participants (mean age 62 yrs, 51% women, 38% white). Kidney function was assessed by estimated glomerular filtration rate (eGFR) and albumin-to-creatinine ratio (ACR). Participants were followed for an average of 12±4 yrs for dementia ICD code hospitalization. Multiple Cox regression models, adjusted for baseline non-modifiable (age, sex, race, and APOE4 carriership) and modifiable risk factors (BMI, smoking, SBP, diabetes, cholesterol, alcohol intake, education, physical activity, and healthy diet score) were used to estimate the association of worse kidney function with incidence of dementia hospitalization.

Results- During follow-up, 268 (4.4%) participants were hospitalized for dementia. Non-modifiable risk factors vs. modifiable risk factors were associated with greater reduction in HRs from a crude model for association between each SD lower eGFR and risk of dementia (70% vs. 8%). Non-modifiable risk factors explained a higher percentage of the association of doubling ACR with risk of dementia than modifiable risk factors (14% vs. 7%) (Figure). Adjusting for all factors, worse kidney function remained associated with incident dementia.

Conclusions- Findings suggest that conventional modifiable and non-modifiable risk factors cannot fully explain higher risk of dementia in relation to worse kidney function. This finding warrants exploring other potential novel vascular and nonvascular mechanisms of this association.


Funding: No

Funding Component: MP12

The Risk of Adverse Outcomes Associated With Opioid Prescriptions in People With Chronic Kidney Disease

Tessa K. Novick, Aditya Surapaneni, Shoshana Ballew, Jung-Im Shin, Caleb Alexander, Johns Hopkins Univ, Baltimore, MD; Lesley A Inker, Tufts Univ, Boston, MA; Alex R. Chang, Geisinger Health System, Danville, PA; Morgan E Grams, Johns Hopkins Univ, Baltimore, MD

Background: Patients with chronic kidney disease have limited therapeutic options for...
pain control and commonly are prescribed opioids. However, many opioids and/or their metabolites are renally excreted, which may increase risk for adverse drug effects. The objective of this study was to assess the safety of prescription opioid use across the range of kidney function.

Methods: We used electronic health data from adult primary care patients followed from 2011 to 2016 in the Geisinger Health System, a fully integrated tertiary care center in Pennsylvania. In a propensity-matched cohort, we used Cox proportional hazards regression to estimate the association between opioid prescription (defined as at least two opioid prescriptions between January 1, 2011 and December 31, 2012) and death, first hospitalization and non-pathologic fracture.

Results: Among 105,328 patients in the study population (mean [SD] age 55.4 [15] years; 66.4% female; 0.1% black race), 20,600 individuals received at least two opioid prescriptions between 2011 and 2013. In the propensity-matched cohort, over a median follow-up of 4.1 years, at least two opioid prescriptions was not significantly associated with mortality (HR 1.19, 95% CI: 0.98 to 1.43), but was significantly associated with higher risk of hospitalization (HR 1.38, 95% CI: 1.26 to 1.50), and non-pathological fracture (HR 1.71, 95% CI: 1.50 to 1.94) (Figure). The risk of adverse outcomes associated with opiate prescription did not differ by level of estimated glomerular filtration rate.

Conclusions: Opioid prescriptions were associated with increased risk for adverse events at all levels of kidney function.

Disclosures:  
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Funding: No

Funding Component:

MP13

Plasma Homocysteine is Causally Associated With Ischemic Stroke in a Han Chinese Population: A Mendelian Randomization Study

Zhengbao Zhu, Tanika N. Kelly, Tulane Univ, New Orleans, LA; Yonghong Zhang, Soocohw Univ, Suzhou, China; Changwei Li, Univ of Georgia, Athens, GA; Aili Wang, Tan Xu, Soocohw Univ, Suzhou, China; Xiao Sun, Mengyao Shi, Tulane Univ, New Orleans, LA; Xiaoqing Bu, Soocohw Univ, Suzhou, China; Jing Chen, Jiang He, Tulane Univ, New Orleans, LA

Introduction: Observational studies identified plasma homocysteine as a risk factor for ischemic stroke, but randomized controlled trials of folate supplementation reported inconsistent findings. The methylenetetrahydrofolate reductase (MTHFR) gene encodes an enzyme critical for homocysteine metabolism and can serve as an unconfounded proxy for plasma homocysteine levels.

Hypothesis: We assessed the hypothesis that there was a causal association between plasma homocysteine and risk of ischemic stroke by Mendelian randomization method.

Methods: We examined the association between the MTHFR gene and ischemic stroke among 11,753 Chinese participants. The discovery stage included 999 ischemic stroke cases and 1,001 controls with no history of atherosclerotic disease. The MTHFR gene was sequenced using the SOLiD 4hq platform. Variants with minor allele count >10 were each
tested for association with stroke using logistic regression models. Interactions between significant variants and alcohol drinking on stroke were also tested. Aggregate analysis of rare variants (minor allele count <20) used the sequence kernel association test. Variants achieving P<1×10^{-4} were tested for replication among 4,724 ischemic stroke cases and 5,029 controls from the China Stroke Project.

**Results:** An association between MTHFR rs1801133, a missense variant known to reduce enzyme activity and increase plasma homocysteine level, and ischemic stroke was identified in discovery, replication and joint analyses (P=2.10×10^{-8}, 2.65×10^{-11}, and 6.93×10^{-17}, respectively). Each copy of the rs1801133 risk allele conferred respective odds ratios (95% confidence interval) of 1.44 (1.27, 1.64), 1.21 (1.15, 1.28), and 1.25 (1.18, 1.31). This variant also interacted with alcohol intake on stroke risk (P for interaction=7.82×10^{-9}, 1.86×10^{-10}, and 1.46×10^{-18}, respectively). Odds ratios (95% confidence interval) of stroke associated with the risk allele were 1.66 (1.40, 1.96), 1.26 (1.18, 1.36), and 1.32 (1.23, 1.40) in non-drinkers and 1.17 (0.92, 1.49), 1.12 (1.01, 1.23), and 1.12 (1.03, 1.23) among alcohol drinkers in discovery, replication and joint analyses, respectively. No additional variants were identified.

**Conclusions:** In conclusion, this is the first large scale genomic study to implicate the etiologic relevance of plasma homocysteine in ischemic stroke. An attenuating effect of alcohol intake on this relation was also observed.


Funding: No

Funding Component:

**MP14**

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**Trends in Stroke Incidence Among Older Adults- ARIC 1990-2016**

**Silvia Koton,** Tel Aviv Univ, Tel Aviv, Israel; Yingying Sang, Andrea L Schneider, Wayne D Rosamond, Rebecca F Gottesman, Josef Coresh, Johns Hopkins Univ, Baltimore, MD

**Introduction**

Stroke incidence has generally declined in the last decades in the US. Using validated stroke data in the Atherosclerosis Risk in Communities (ARIC) study, we have previously shown decreasing stroke incidence rates from 1987 to 2011 among ≥65 years old (JAMA 2014). We evaluated whether stroke incidence declines among older adults continued during 2011 to 2016.

**Methods**

Among 15,792 individuals recruited in ARIC in 1987-1989, 14,357 were free of stroke at baseline and eligible for the present study. Definite or probable stroke events were identified with a computer algorithm and physician reviews. Cases before 1990 were not included. We studied crude incidence rates (per 1,000 person-years) stratified by 5-year periods for age group and 3-year calendar period of follow-up. Temporal trends in rates were estimated using Poisson regression incidence rate ratios adjusted for age, gender, race-center, and time-varying hypertension, diabetes, coronary heart disease, cholesterol lowering medication use and smoking.

**Results**

In ARIC, 1,279 incident strokes occurred over 320,089 person-years among 14,357 participants. Five age-groups were studied: 65-69, 70-74, 75-79, 80-84 and ≥85. Length of follow-up periods differed by age-group as ARIC is a closed cohort. In the 75-79 years old, representative for groups with long follow-up, crude incidence rates (95% CI) per 1,000 person-years decreased from 10.37 (7.11-15.13) in 1999-2001 to 6.58 (4.93-8.79) in 2011-2013 and 5.67 (4.16-7.73) in 2014-2016. Decreasing incidence rates were observed in the analysis by gender and race as well. Linear trends in
incidence rate ratios for 3-year periods showed a decrease in adjusted stroke incidence rates from 1990 to 2016 in ARIC participants ≥65 years old (Figure).

**Conclusions**

Validated total stroke incidence rates among ≥65 years old decreased over calendar time in the ARIC cohort. The decrease in rates reported to 2011 extends for the subsequent 5 years (to 2016) in men and women, whites and African-Americans.

**Figure:** Adjusted stroke incidence rate ratios over 3-year calendar periods among Atherosclerosis Risk in Communities (ARIC) study participants ≥65 years old.

*Models were adjusted for age, sex, race-center, and time-varying hypertension, diabetes, coronary heart disease, cholesterol lowering medication use and smoking. Dots represent adjusted incidence rate ratio point estimates from model run using a categorical calendar-time variable, plotted at mid-point of each 3-year calendar time category with 1999-2001 as the reference category. The solid line represents the linear trend in adjusted incidence rate ratios and the shaded area represents the 95% confidence interval with 2000 as the reference point.


Funding: No

**Background**

Accurate identification of stroke cases from electronic health record (EHR) is needed for efficient and valid clinical and epidemiology research. A number of studies have evaluated the validity of using ICD-9 and ICD-10 codes for stroke identification. Previous research results show that sensitivity and positive predictive value (PPV) for stroke identification is the lowest among all other cerebrovascular diseases, with notable differences observed by stroke pathological subtypes. While most prevalent cerebrovascular disease cases can be detected using 430-438/I60-I69 collectively, more accurate and comprehensive stroke phenotyping algorithm is needed to identify incident stroke cases from EHR. In our work, we compared case identification results using ICD-codes exclusively with ICD plus a natural language processing (NLP) algorithm.

**Methods**

We developed the NLP part of our stroke algorithm using a list of expert provided stroke-related keywords, which covers transient ischemic attack (TIA), ischemic stroke, and hemorrhagic stroke. We validated the hybrid (ICD+NLP) algorithm and compared it with ICD-exclusive algorithm in a previously established atrial fibrillation cohort (n=5,062). Clinical notes and ICD codes of all patients after the incident AF event were reviewed by two nurse abstracters to confirm new stroke incidences. All past clinical notes and ICD codes of a subset of patients (n=402) were reviewed to confirm lifetime (prior and current) stroke cases. Manual abstraction results were considered the gold standard for evaluation of ICD only and ICD+NLP automatic extraction. Sensitivity and positive predictive values (PPV) of both algorithms were calculated.

**Results**

Among 5,062 patients, 593 patients were confirmed to have suffered a stroke after atrial fibrillation while 4,469 patients were confirmed with no EHR evidence of stroke after AF. The ICD-exclusive algorithm had a sensitivity of 47.2% and a PPV of 47.8% for detecting new stroke incidences. The hybrid stroke algorithm
achieved a sensitivity of 92.4% and a PPV of 60.6% for extraction of incident stroke. For extraction of lifetime stroke cases, the hybrid approach achieved a sensitivity of 93.9% and a PPV of 88.7%. Performance of new stroke incidence extraction is limited because past/current stroke mentions in clinical notes are difficult to distinguish by our NLP algorithm (may be a future direction).

Conclusions
We developed and validated a stroke algorithm that performed well for identifying incident and lifetime stroke cases. The addition of NLP into the stroke algorithm improved the sensitivity and PPV of compared to an ICD-exclusive algorithm.


Funding: Yes

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MP16

Incremental Diagnostic Yield of 4 Weeks versus 2 Weeks of Ambulatory Heart Rhythm Monitoring for the Detection of Subclinical Atrial Fibrillation: The Atherosclerosis Risk in Communities (ARIC) Study

Mary R Rooney, Univ of Minnesota, Minneapolis, MN; Elsayed Z Soliman, Wake Forest Univ, Winston-Salem, NC; Pamela L Lutsey, Faye L Norby, Univ of Minnesota, Minneapolis, MN; Laura R Loehr, Univ of North Carolina, Chapel Hill, NC; Thomas Mosley, Univ of Mississippi, Jackson, MS; Michael Zhang, Univ of Minnesota, Minneapolis, MN; Rebecca Gottesman, Josef Coresh, Johns Hopkins Univ, Baltimore, MD; Aaron R Folsom, Univ of Minnesota, Minneapolis, MN; Alvaro Alonso, Emory Univ, Atlanta, GA; Lin Y Chen, Univ of Minnesota, Minneapolis, MN

INTRODUCTION: Subclinical atrial fibrillation (AF) has been associated with greater stroke risk; however, subclinical AF can be intermittent, and hence hard to detect. Little is known about the diagnostic yield of extending electrocardiogram (ECG) monitoring beyond 2 weeks on subclinical AF detection, particularly among individuals without a clinical indication.

HYPOTHESIS: Extending ECG monitoring from 2 weeks to 4 weeks will increase detection of AF

METHODS: We included ARIC study participants who attended visit 6 (2016-2017), without a history of AF, and who wore a leadless, ambulatory ECG monitor (Zio® XT Patch by iRhythm Technologies Inc.) twice, each time for up to a maximum of 2 weeks. AF history was based on ARIC ascertainment (hospitalization codes through 2016, ECGs at prior ARIC visits 1-5) or self-reported AF at visit 6. AF on the Zio® XT Patch was defined as an irregularly irregular rhythm with absent P-waves lasting ≥30 seconds.

RESULTS: We included 387 ARIC participants (mean ± SD aged 79 ± 4 years, 54% female, 11% non-white race). Mean recording time was 13.3 ± 1.7 days for the first Ziopatch, 13.1 ± 2.0 for the second patch, and 26.4 ± 2.9 for the combined 4 weeks. Based on ≤2 weeks of monitoring, the prevalence of subclinical AF was 2.6% (95% CI: 1.0-4.2%; n=10); this increased to 4.4% (95% CI: 2.4-6.4%; n=17) with ≤4 weeks of monitoring. Thus, the incremental diagnostic yield of 4 weeks versus 2 weeks of monitoring was 70% (95% CI: 41.6-98.4%). The mean time to first AF episode was 10.5 ± 8.0 days with a median of 13.4 days (IQR=2.0-19.7). Cumulative yield of AF detection over the monitoring time is shown in the Figure.

CONCLUSIONS: Among elderly community-dwelling individuals, extending ECG monitoring from 2 weeks to 4 weeks increased detection of AF. These findings help inform the debate on ECG screening for subclinical AF; however, more research is needed to define the optimal duration of ECG monitoring time.

Funding: No

Funding Component:

MP17

Comorbidity Type and Risk of Hospitalization and Death in Patients With Atrial Fibrillation

Alanna M Chamberlain, Mayo Clinic, Rochester, MN; Alvaro Alonso, Emory Univ, Atlanta, GA; Peter Noseworthy, Ruoxiang Jiang, Susan Weston, Mayo Clinic, Rochester, MN; Pamela Lutsey, Lin Chen, Univ of Minnesota, Minneapolis, MN; Wesley O’Neal, Emory Univ, Atlanta, GA; Lindsay Bengtson, Optum, Minneapolis, MN; Faye Norby, Univ of Minnesota, Minneapolis, MN; J’Neka Claxton, Emory Univ, Atlanta, GA; Richard MacLehose, Univ of Minnesota, Minneapolis, MN; Veronique Roger, Mayo Clinic, Rochester, MN

Background: Multimorbidity is common in atrial fibrillation (AF); however, the impact of the number and type of comorbid conditions on death and hospitalizations is uncertain.

Methods: The prevalence of 17 chronic conditions was obtained in 1430 patients with incident AF from 2000-2010 from Olmsted County, MN. Chronic conditions were ascertained electronically prior to AF and were classified into 3 groups: cardiovascular (CV), other physical, and mental. All hospitalizations and deaths were obtained through 12/31/2014. Associations of the number and type of condition and each individual condition with hospitalizations and death were determined using Andersen-Gill and Cox regression, respectively. Results: Among the 1430 patients with AF (median age 76 years, 48.6% men), the mean (SD) number of chronic conditions was 4.7 (2.7). A total of 4496 hospitalizations and 812 deaths occurred over a mean (SD) follow-up of 5.4 (4.1) years. An increase in the number of conditions of each type was associated with increased risks of death and hospitalizations (Table). Mental conditions (which included depression, anxiety, dementia, schizophrenia, and substance abuse) exhibited the strongest association with death, whereas other physical conditions exhibited the strongest association with hospitalizations. Individual predictors of death included heart failure (HF), hypertension, chronic obstructive pulmonary disease (COPD), chronic kidney disease (CKD), depression, dementia, and substance abuse. Predictors of hospitalizations included HF, coronary artery disease, diabetes, COPD, CKD, arthritis, osteoporosis, and substance abuse.

Conclusions: Patients with AF have many comorbid conditions which are associated with death and hospitalizations. Although conditions of each type were associated with outcomes, mental conditions exhibited strongest association with death. These data highlight the importance of management of not only CV comorbidities but other physical and mental comorbidities in patients with AF.

| Table: Hazard ratios (95% CI)* for death and hospitalizations by type of comorbid conditions |
|--------------------------------------------------|-------------------------------|-------------------------------|-------------------------------|
|                            | CV-related conditions | Other physical conditions | Mental conditions |
| Death                      | 1.15 (1.10, 1.21)      | 1.11 (1.04, 1.18)          | 1.30 (1.21, 1.40)           |
| Hospitalizations           | 1.14 (1.11, 1.18)      | 1.20 (1.16, 1.25)          | 1.09 (1.03, 1.15)           |

*Each hazard ratio represents the risk per increase of 1 condition adjusted for age, sex and the number of conditions in each of the other two types of comorbid conditions.

Other physical conditions include arthritis, osteoporosis, asthma, chronic obstructive pulmonary disease, chronic kidney disease, and cancer.

Mental conditions include depression, anxiety, dementia, schizophrenia, and substance abuse.

Funding: No

Funding Component:

MP18

Trajectories of Oral Anticoagulation Adherence After First Atrial Fibrillation Diagnosis

Inmaculada Hernandez, Meiqi He, Nemin Chen, Univ Pittsburgh, Pittsburgh, PA; Samir Saba, Univ Pittsburgh Medical Ctr, Pittsburgh, PA; Walid Gellad, Univ Pittsburgh, Pittsburgh, PA

Introduction Regardless of the benefits of stroke prevention, only 50% of atrial fibrillation (AF) patients recommended for oral anticoagulation (OAC) actually use these medications. We identified groups of patients with similar OAC adherence patterns, and evaluated what patient characteristics affect group membership. Hypothesis We hypothesized that patients continuously adherent to OAC would be more likely to reside in the Midwest and Northeast and have higher socioeconomic score (SES) than patients who never used OAC. Methods Using Medicare claims data, we identified continuously enrolled beneficiaries with a first diagnosis of AF in 2014-2015 (n=36,185). We calculated the proportion of days covered with OAC in the first 12 months after first diagnosis. Using group-based trajectory models, we identified trajectories of OAC adherence. We constructed multinomial logistic regression to evaluated how a comprehensive list of demographics, system-level factors and clinical characteristics (list in figure) affected group membership. Results We identified 4 trajectories of OAC adherence: patients who never used OAC (group 1, 43.6%), late OAC initiators (group 2, 7.6%), early OAC initiators who discontinued OAC (group 3, 8.9%), and continuously adherent patients (group 4, 39.9%). Black race, eligibility for low income subsidy, residence in segregated metropolitan areas (measured by index of dissimilarity), residence in the Southeast, Southwest or West, higher HAS-BLED score, and chronic kidney disease decreased the odds of belonging to the continuously adherent group. Conclusions Trajectories of OAC adherence were highly variable, and were determined not only by demographics and clinical characteristics, but also system-level factors including income level, segregation measures, and region of residence. These trajectories may be useful in the implementation of targeted strategies to mitigate OAC underuse in stroke prevention.

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Socioeconomic Status and Incident Heart Failure Among Individuals with Diabetes, Obesity and Metabolic Syndrome: The Atherosclerosis Risk in Communities (ARIC) Study

Amira O Collison, Lena M Mathews, Johns Hopkins Sch of Med, Baltimore, MD; Lucia Kwak, Johns Hopkins Sch of Public Health, Baltimore, MD; Priya Palta, Univ of North Carolina Gillings Sch of Global Public Health, Chapel Hill, NC; Kunihiro Matsushita, Johns Hopkins Sch of Med, Baltimore, MD; April P Carson, Univ of Alabama at Birmingham Sch of Public Health, Birmingham, AL; Deidra C Crews, Sherita H Golden, Johns Hopkins Sch of Med, Baltimore, MD; April P Carson, Univ of Alabama at Birmingham Sch of Public Health, Birmingham, AL; Deidra C Crews, Sherita H Golden, Johns Hopkins Sch of Med, Baltimore, MD; Lisa A Cooper, Josef Coresh, Johns Hopkins Sch of Med, Baltimore, MD; Gerardo Heiss, Univ of North Carolina Gillings Sch of Global Public Health, Chapel Hill, NC; Chiadi E Ndumele, Johns Hopkins Sch of Med, Baltimore, MD

Background: Diabetes, obesity and metabolic syndrome (MS) are strong risk factors for incident heart failure (HF). Lower socioeconomic status (SES) is also linked to increased HF risk. Given the importance of lifestyle, self-management, and access to care in managing diabetes, MS and obesity, SES may confer greater risk among individuals with these conditions. Hypothesis: We hypothesized that lower SES is associated with greater risk for incident HF among individuals with diabetes, MS or obesity than among those without these conditions. Methods: We studied 12,938 ARIC participants (mean age: 53 years, 26% black, 56% female) from the baseline visit (1987-1989) without CVD and with BMI ≥18.5 kg/m². Income, education, and area deprivation index were evaluated as single measures of SES and in a combined SES score (high, medium, low). We constructed Cox regression models to estimate hazard ratios (HRs) for HF associated with SES (through 12/31/16), stratified by diabetes, MS, and obesity status, separately, and with tests for interactions of SES with diabetes, MS or obesity. Results: There were 2,551 HF events over a median 27 years of follow-up. The lowest education level was more strongly associated with HF risk in the presence of diabetes (HR 3.17, 95% CI: 1.95-5.14), than in the absence of diabetes (HR 1.56, 95% CI: 1.31-1.86; p interaction <0.01) (Table). Significant interactions were also observed for diabetes and MS with most other SES measures, including the combined SES score. The combination of lowest education and diabetes was associated with an HR of 3.95 (3.21-4.87) for HF compared to the combination of highest education and no diabetes. There were no significant interactions between obesity and SES measures. Conclusion: Low SES is associated with elevated HF risk, particularly among individuals with diabetes and MS. There is urgent need to understand the underlying mechanisms for this association, which may inform tailored interventions to address the marked HF risk in those with both low SES and diabetes or MS.


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Ethnic Differences in Coronary Heart Disease and Stroke Diagnosis Among Blacks in the United States

Nishit Patel, Cheryl Dennison Himmelfarb, Ruth-Alma Turkson-Ocran, Yvonne Commodore-Mensah, Johns Hopkins Sch of Nursing, Baltimore, MD

Introduction: African-Americans bear a disproportionate burden of atherosclerotic cardiovascular disease than other racial/ethnic groups in the U.S. With current globalization trends, Black immigrants from Africa and Caribbean Islands contribute to the ethnic diversity of Blacks in the U.S. Despite the diversity in socioeconomic status, culture and genetic admixture, Black immigrants are traditionally combined with African Americans, therefore limiting opportunities to understand the health of Black immigrants. Hypothesis: Ethnic differences in coronary heart disease (CHD) and stroke prevalence exist among African-Americans (AAs), African-immigrants (AIs) and Afro-Caribbean (ACs).

Methods: We conducted a cross-sectional study of the 2010-2016 National Health Interview Survey. CHD and stroke diagnoses were self-reported. We performed a descriptive and multivariable logistic regression analyses adjusting for demographic and health characteristics and stratified by sex. Results: We included 34,513 participants who were AAs (N=30,516), AIs (N=1,371) and ACs (N=2,626). Significant differences in sociodemographic characteristics were observed. AIs were the youngest (39 years) with the highest proportion of college graduates (51%). AAs (42%) were more likely to report hypertension diagnosis than AIs (19%) and ACs (36%) (p<0.05) Also, AAs (44%) were more likely to be overweight/obese than AIs (24%) and ACs (31%) (p<0.05). Diabetes prevalence was similar for AAs (13.7%) and ACs (12.8%), and lower for AIs (6.3%). Adjusted models showed that AAs were more likely to report CHD or stroke diagnoses than AIs and ACs (p<0.05). Sex-stratified models showed AA (4.2%) and AI (3.2%) women reporting similar rates of CHD diagnosis. (Table) Conclusion: Ethnic differences were noted in the prevalence of CHD and stroke diagnosis and risk among Blacks. Future studies should examine the health advantage of AIs and ACs to inform interventions and policy to improve the health of AAs and maintain the health of foreign-born Blacks.

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Background: Several heart failure (HF) risk factors, including hypertension, diabetes mellitus, obesity, and physical activity, are well described. However, the degree to which optimization of these modifiable risk factors might impact the incidence of HF is not yet fully defined.

Hypothesis: We hypothesized more optimal control of major modifiable HF risk factors is associated with progressively lower HF risk.

Methods: We performed a prospective analysis of 13,534 ARIC participants (mean age 57, 55% female), examining HF risk associations of different cutpoints of glycemia (HbA1c), systolic blood pressure (SBP), body mass index (BMI) and physical activity (assessed at Visit 2 [1990-92], except for physical activity assessed at Visit 1 [1987-89]). Optimal risk factor control was defined as HbA1c < 7%, SBP < 120 mmHg, BMI 18.5-25 kg/m², and AHA-recommended activity levels. Severely uncontrolled risk factors were defined as HbA1c > 8%, SBP > 160 mmHg, BMI > 35 kg/m² and no exercise physical activity. Intermediate values were considered mild to moderately uncontrolled. Cox models simultaneously including all risk factors were constructed to assess associations of risk factor levels with incident HF (by discharge codes) after Visit 2 through 2016.

Results: There were 2,827 HF events over a median 24 years of follow-up. Risk gradations were seen across categorizations of each risk factor (Table). In the full model, relative to optimal control, HRs were 2.06 for BMI ≥ 35 kg/m², 1.16 for poor physical activity, 2.31 for HbA1c > 8% and 1.80 for SBP ≥ 160 mmHg. No risk gradient was seen from SBP 120 to 140 mmHg among hypertensives. Incidence rates (per 1000 PYs) were 7.9 for all optimally controlled risk factors, 14.5 for 3-4 mild to moderately uncontrolled risk factors and 39.5 for 3-4 severely uncontrolled risk factors.

Conclusion: Optimal control of modifiable risk factors is strongly linked to lower HF risk. Our findings suggest prioritizing optimization of existing risk factors may be central to successful strategies to prevent HF onset.


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MP22

Ideal Cardiovascular Health and Lifetime Risk of Cardiovascular Disease: the Cardiovascular Disease Lifetime Risk Pooling Project

Joshua D Bundy, Hongyan Ning, Amanda E Paluch, Victor W Zhong, Donald M Lloyd-Jones, John T Wilkins, Norrina B Allen, Northwestern Univ, Chicago, IL

Introduction: Ideal cardiovascular health (CVH) is associated with lower risk of cardiovascular disease (CVD) compared with intermediate and poor CVH. Quantifying the associations of ideal, intermediate, and poor CVH with lifetime risk of CVD can improve estimation of future population disease burden.

Hypothesis: Individuals with ideal CVH have lower lifetime risk of CVD compared with
individuals with intermediate and poor CVH.

**Methods:** We pooled individual-level data from 7 US cohort studies (n=34027) that are included in the Lifetime Risk Pooling Project. We defined CVH based on levels of 7 health factors: smoking status, body mass index, physical activity, dietary pattern, total cholesterol, blood pressure, and diabetes mellitus. Each factor is scored as ideal (2 points), intermediate (1 point), or poor (0 points). The total CVH score was used to define overall CVH according to categories of ideal (12-14 points), intermediate (9-11 points), or poor (0-8 points). We used a modified Kaplan-Meier analysis, accounting for the competing risk of death, to assess the lifetime risk of CVD (CVD deaths, myocardial infarction, stroke, heart failure) separately in men and women free of CVD at index age categories of <40, 40-59, and ≥60 years.

**Results:** Over 553379 person-years of follow-up, we observed 6858 CVD events (103 events in ideal, 1514 in intermediate, and 5241 in poor CVH categories). Men had higher lifetime risk of CVD than women across all CVH categories. In the 40-59 years index age group (Figure), participants with ideal CVH had lower lifetime risk of CVD (men, 14.3%; women, 12.0%) compared with intermediate (men, 21.9%; women, 16.9%) and poor (men, 42.7%; women, 33.8%) CVH. Patterns were similar for the <40 and ≥60 years index age groups.

**Conclusions:** Ideal CVH is associated with substantially lower lifetime risk of CVD in US men and women. Further research is warranted to investigate strategies for maintaining and restoring ideal CVH throughout the life course to prevent associated risk of CVD.
HF, cancer, and VTE in 2005. We identified incident HF from hospitalization records starting in 2005, and when possible was further subcategorized from hospital record review as HF with preserved ejection fraction ≥50% (HFpEF) or reduced ejection fraction of <50% (HFrEF). Incident VTE was adjudicated by physician review and classified as pulmonary embolism (PE) or deep venous thrombosis (DVT), and provoked or unprovoked. We used Cox proportional hazards models to evaluate the association between time-dependent HF and incident VTE. Follow-up time accrued from 2005 until date of VTE, loss to follow-up, death, or the end of 2015, whichever came first.

Results - During a mean follow-up of 10 years, we identified 1005 participants who developed hospitalized HF (28% HFpEF; 27% HFrEF) and 262 who had incident VTE events. Incident HF was associated with a significantly higher risk of subsequent incident VTE: multivariable hazard ratio (HR) 5.15, 95% confidence interval (CI) 3.80-6.98. The risk of VTE was similar for HFpEF and HFrEF; HR (95% CI) = 4.71 (2.94-7.52) and 5.53 (3.42-8.94), respectively. The risk was similar when the VTE outcome was subclassified as PE or DVT or as provoked or unprovoked.

Conclusion - In this large population-based study, incident HF was associated with a greatly increased risk of VTE, and the risk was similar in participants with HFpEF and HFrEF. Health care providers should consider possible evidence-based strategies to prevent VTE in HF patients, regardless of HF classification.


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MP24

Women Experience Higher Rates of Surgical Repair and Mortality for Abdominal Aortic Aneurysm

Niveditta Ramkumar, The Dartmouth Inst, Lebanon, NH; Bjorn D Suckow, Dartmouth Hitchcock Medical Ctr, Lebanon, NH; Art Sedrakyan, Weill Cornell Medical Coll, New York, NY; Philip P Goodney, Dartmouth Hitchcock Medical Ctr, Lebanon, NH; Jeremiah R Brown, The Dartmouth Inst, Lebanon, NH

Background: It is unknown how gender disparities in the clinical presentation of abdominal aortic aneurysm (AAA) affects AAA repair type and long-term survival. We assessed the hypothesis that compared to men, women face a higher risk of death after AAA repair due to differences in demographics, disease severity, and repair type. Methods: We analyzed all endovascular (EVAR) and open surgical (OPEN) AAA repairs from 2003-2015 in the Vascular Quality Initiative-Medicare linked registry. Using inverse probability weighting, we balanced patient demographics, comorbidities, and disease severity among men and women. Then, we evaluated the effect of gender on AAA treatment and subsequent survival using Poisson and Cox regression, respectively.

Results: In this cohort (n=16,085), patients undergoing EVAR (79%) or OPEN (21%) had up to 12 years of follow-up. Women comprised 22% of the cohort and were older (mean age 77 ±6.6 vs. 75 ±6.5 years, p<0.001), less likely to smoke (28% vs. 33%, p<0.001), and had smaller aneurysms (58.7 ±18.5 mm vs 56.5 ±12 mm) than men (Figure). After balancing key risk factors, women were 1.6 times more likely to receive OPEN vs. EVAR (RR: 1.59, 95% CI: 1.46-
1.72). The 12-year mortality rate after AAA repair was 74% in men vs 84% in women. After adjustment, women faced a 12% increased risk of death (HR: 1.12, 95% CI: 1.04-1.21). Sub-analysis by repair type revealed a gender discrepancy among EVAR patients, where women experienced poorer survival (HR: 1.18, 95% CI: 1.09-1.29), while men and women faced an equal risk of death after OPEN (HR: 1.00, 95% CI: 0.90-1.12). Conclusion: In conclusion, women were 1.6 times more likely to undergo OPEN repair than men, despite balancing key baseline AAA risk factors associated between men and women. After EVAR, women were 12% more likely to die than men, though no gender-based mortality difference exists following OPEN repair. The differential treatment benefit of EVAR in women is concerning given the trend toward an endovascular-first treatment approach to AAA.

Jill Landsbaugh Kaar, Sarah Schmiege, Univ of Colorado, Aurora, CO; Heidi Kalwarf, Jessica G Woo, Univ of Cincinnati, Cincinnati, OH; Stephen Daniels, Stacey L Simon, Univ of Colorado, Aurora, CO

Objective: To identify sleep patterns in early childhood and examine the influence of these patterns on health behaviors and obesity.

Methods: Prospective cohort study of healthy 3-year old children (n=301) measured annually through age 6. Parent-reported total sleep duration (TSD) was calculated as night-time sleep plus daytime naps. Insufficient sleep was defined as TSD <10 hours/day. A latent growth curve model was estimated to establish the trajectory of TSD over four years. At each time period, univariate regression models were estimated to: (a) identify modifiable and demographic (i.e., race/ethnicity, gender) predictors of insufficient sleep and (b) test the association of insufficient sleep with health behaviors (i.e., diet, screen time) and obesity status (adjusting for time-specific daily energy intake, screen time, and moderate-vigorous physical activity (MVPA)).

Results: The analytical cohort was 49% female, predominately white (82%) with 36% reporting household incomes below $50,000. At age 3, 21% were defined as overweight or obese and at age 6, 32% of the cohort were defined as overweight or obese. Children had a similar bed and wake time across the four-year study with an average bedtime at 9:27PM and waketime at 8:01AM. Growth curve modeling showed decreases of 39.6 minutes in TSD from age 3 to age 6; though statistically significant (p<0.001), this may be due to the developmental expected decrease in daytime naps over this age range. The most consistent modifiable predictors of insufficient sleep from ages 4-6 years were bedtimes after 9PM (age 4 OR: 27.3 (95%CI: 3.7, 201); age 5 OR: 37.3 (95% CI: 5.1, 274); age 6 OR: 13.2 (95% CI: 3.1, 55)) and insufficient sleep the prior year (age 4 OR: 11.4 (95%CI: 3.8, 34); age 5 OR: 5.9 (95% CI: 3.0, 11.6); age 6 OR: 6.5 (95% CI: 3.4, 12.4)). Children reported as “non-white” were more likely to be classified with


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insufficient sleep at ages 4-6 years (age 4 OR: 2.6 (95%CI: 1.3, 5.2); age 5 OR: 2.39 (95% CI: 1.2, 4.7); age 6 OR: 2.2 (95% CI: 1.1, 4.3)). Children at ages 5-6 years with insufficient sleep reported 29 and 36 minutes more screen time per day compared to those with sufficient sleep (p < 0.05). Insufficient sleep did not predict diet and MVPA behaviors. Insufficient sleep status was also significantly associated with obesity status as children with insufficient sleep at age 5 were 2.22 times (95% CI: 1.20, 4.1) more likely to be overweight and obese compared than children with adequate sleep (p = 0.01).

Conclusions: Sleep patterns appear to be established by age 3 years with little change throughout young childhood, and with implications for early obesity development. Early intervention to improve sleep may be necessary during this time, especially for children from racial/ethnic minority backgrounds, prior to the establishment of sleep patterns, to prevent negative consequences of insufficient sleep.


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MP26

Visceral Obesity and Systemic Inflammation Predict Sleep Disordered Breathing in Normal Weight, Never Obese Adolescents: A Longitudinal, Population-Based Study

Jacqueline M Danisi, Julio Fernandez-Mendoza, Fan He, Marjorie D Sawyer, Susan L Calhoun, Jason Liao, Duanping Liao, Alexandros N Vgontzas, Edward O Bixler, Penn State Coll of Med, Hershey, PA

Introduction: Although obesity is a known risk factor for sleep disordered breathing (SDB), a significant proportion of children with SDB are not obese or overweight as per body mass index percentile (BMI%) for age-and-sex. It is unknown whether premorbid or concurrent adiposity phenotypes are associated with SDB in normal weight youth. **Hypothesis:** We hypothesize that central obesity is a predictor of apnea/hypopnea index (AHI) in adolescents who have been otherwise normal weight since childhood. **Methods:** We analyzed data from the Penn State Child Cohort (N=421), a random population-based sample of 8.7 (1.7) year old children followed-up as 17.0 (2.3) year old adolescents. Of these, 242 subjects (49.2% female, 18.2% minority) were classified as persistently normal weight based on BMI%<85 at both baseline and follow-up. Neck, hip and waist circumference (WC) were measured and “central obesity” was defined as a WC%≥85 for age-and-sex at baseline. During the follow-up exam, android and gynoid distribution and subcutaneous (SAT) and visceral (VAT) adipose tissue composition were assessed via DEXA scan, while inflammatory biomarkers were assayed from a fasting blood sample. The AHI was obtained from 9-hour, in-lab polysomnography at baseline and follow-up. Multivariable linear regression models examined the association between adiposity and inflammation with AHI at follow-up while adjusting for sex, race, adenotonsillectomy, age and AHI at baseline. **Results:** The average AHI at baseline was 0.7 (0.9) events/hour and 2.3 (6.3) events/hour at follow-up. Unadjusted analyses showed that WC (β=0.159) and central obesity (β=0.227) at baseline, but not BMI%, neck or hip circumference, and VAT (β=0.307), IL-6 (β=0.245), SAT (β=0.235), CRP (β=0.222), and android distribution (β=0.195) at follow-up were significantly (P<0.05) associated with a higher follow-up AHI. Multivariable-adjusted analyses showed that VAT (β=0.299), IL-6 (β=0.191), central obesity (β=0.185) and CRP (β=0.163) were independently associated with a higher follow-up AHI. **Conclusions:** This is the first study to demonstrate that central obesity in childhood is a strong predictor of SDB in adolescence, even in individuals who have been persistently normal weight since childhood as
per BMI% standards. These data support the clinical utility of simple measures of central obesity in childhood (i.e., WC) as early surrogate markers of increased risk of future development of SDB in the transition to adolescence. Furthermore, our study demonstrates that increased visceral adiposity and systemic inflammation are strong correlates of adolescent SDB, which supports the clinical utility of these biomarkers in predicting the cardiometabolic risk associated with adolescent SDB.


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MP27

The Association Between Psychosocial Factors and Sleep Among African-American Men and Women, the Jackson Heart Sleep Study

Dayna A. Johnson, Emory Univ, Atlanta, GA; Na Guo, Brigham and Women's Hosp, Boston, MA; Tené T Lewis, Emory Univ, Atlanta, GA; Tamar Sofer, Brigham and Women's Hosp, Boston, MA; David R. Williams, Harvard Univ, Boston, MA; Mario Sims, James G. Wilson, Univ of Mississippi Medical Ctr, Jackson, MS; Susan Redline, Brigham and Women's Hosp, Boston, MA

Background: Emerging evidence suggests that sleep traits and disorders are strong predictors of cardiovascular disease (CVD), particularly among African-Americans. Identifying determinants of insufficient sleep among African-Americans may help to target interventions and potentially reduce CVD burden. Psychosocial factors may be particularly relevant to sleep health among African-Americans; however, more research is needed using objective and well-validated sleep assessments. We investigated associations of individual and aggregate psychosocial factors (e.g. stress, depression, anxiety) with objectively-measured sleep traits and insomnia; and examined differences by sex among African-Americans.

Methods: Between 2012 and 2016, Jackson Heart Sleep Study (JHSS) participants (N=913) underwent 7-day wrist actigraphy, had a clinic visit and completed questionnaires. Actigraphy-based measures included short sleep duration (<6 hours), low sleep efficiency (< 85%), and wake after sleep onset (WASO). Insomnia was assessed by the Women's Health Initiative Insomnia Rating Scale (WHIIRS ≥10). A composite psychosocial factors variable was created based on the number of high-level factors that the participant reported: top quintile of stress (Perceived Stress Scale ≥ 18), high depressive symptoms (Center for Epidemiologic Studies Depression Scale-20, excluding restless sleep, ≥ 16), and top quintile of anxiety (State-Trait Anxiety Inventory score ≥ 38). Linear and logistic regression models were fit to test associations between psychosocial factors and sleep outcomes, adjusted for demographics, socioeconomic status, body mass index (BMI), and physical activity. Psychosocial factors and sex interactions were tested in adjusted models.

Results: JHSS participants had a mean age of 63.4 years (standard deviation: 10.7), 33.6% were male, 53.6% had a college degree and the mean BMI was 31.9 kg/m² (6.9). Short sleep and low sleep efficiency were common, 26.1% and 30.0%, respectively. The average WASO was 54.5 (23.5) minutes. Psychosocial factors and sex interactions were associated with insomnia. Adverse psychosocial factors were associated with a higher odds of insomnia, adjusted odds ratio (aOR)=1.65 (95% confidence interval: 1.39, 1.95). High anxiety, but not stress or depressive symptoms were associated with a short sleep duration, aOR=2.00 (1.34, 2.98). There was no evidence of associations between psychosocial factors and sleep efficiency or
WASO in the overall sample. However, in males only, high anxiety and stress were associated with lower sleep efficiency, $P<0.05$ for all.

Conclusion: Stress and negative emotional state, anxiety and depressive symptoms were associated with insomnia. Short sleep duration was specifically associated with anxiety. Psychosocial factors may be a point of intervention for improving sleep health, particularly among men.


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MP28

The Association Between Sleep Apnea and Left Ventricular Structure and Function: The ECHO-SOL Ancillary Study

Rachel P Ogilvie, Michael V Genuardi, Sanjay R Patel, Jared W Magnani, Univ of Pittsburgh, Pittsburgh, PA; Susan Redline, Harvard Medical Sch, Boston, MA; Martha L Daviglus, Univ of Illinois at Chicago, Chicago, IL; Neomi Shah, Icahn Sch of Med at Mount Sinai, New York, NY; Alberto R Ramos, Univ of Miami Miller Sch of Med, Miami, FL; Jianwen Cai, Univ of North Carolina, Chapel Hill, NC; Barry E Hurwitz, Univ of Miami Miller Sch of Med, Miami, FL; Mayank Kansal, Univ of Illinois Hosp and Health System, Chicago, IL; Carlos J Rodriguez, Wake Forest Univ Sch of Med, Winston-Salem, NC

Background: Obstructive sleep apnea (OSA) initiates a range of pathophysiologic mechanisms which may promote cardiac disease, but few studies have examined the association of OSA with global longitudinal strain (GLS) and diastolic function, especially among middle aged and older Hispanics/Latinos in the United States.

Methods: We examined cross-sectional data from adults aged 18-64 in the Hispanic Community Health Study/Study of Latinos ECHO-SOL Ancillary Study (2011-2014), a representative subsample of the parent study. OSA was assessed using an ARES Unicorder sleep apnea monitor for one night; the apnea-hypopnea index (AHI) was obtained. Echocardiographic measures evaluated left ventricular (LV) structure (LV mass index [LVMI], left atrial volume index), systolic function (ejection fraction, GLS) and diastolic function ($E'$ and $E/e'$ ratio). Potential confounders included age, sex, ethnicity, and body mass index. Multivariable linear regression was used to model the association between AHI and the echocardiographic outcomes. All analyses accounted for the complex survey design.

Results: Among 1,506 participants (median age 55.0, interquartile range 49.0, 62.0, 58.3% female) with both sleep and echo data, 17.9% had an AHI ≥15 and 3.2% had an ejection fraction <50%. Each 10-unit higher AHI was associated with 1.4 (95% CI 0.3, 2.5) g/m² greater LVMI, 0.1 (0.0, 0.3) worse GLS, 0.2 (0.1, 0.3) lower $E'$, and 0.3 (0.1, 0.5) greater $E/E'$ ratio. There were no associations between AHI and left atrial volume index or ejection fraction. Conclusion: OSA was associated with poorer LV GLS and diastolic function indices, but associations with structure and ejection fraction were less consistent. Subclinical LV dysfunction may precede the onset of symptomatic disease in this at-risk population. Further studies are needed to determine the longitudinal association of OSA and cardiac remodeling.


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MP29

Body Fat and Cardiovascular Disease Risk in Postmenopausal Women With Normal Body Mass Index: the Women’s Health Initiative

Guo-Chong Chen, Rhonda Arthur, Albert Einstein Coll of Med, Bronx, NY; Neil M. Iyengar, Memorial Sloan Kettering Cancer Ctr, New York, NY; Victor Kamensky, Xiaonan Xue, Albert Einstein Coll of Med, Bronx, NY; Sylvia Wassertheil-Smoller, Weill Cornell Medical Coll, New York, NY; Matthew A. Allison, Univ of California, San Diego, CA; Aladdin H. Shadyab, Univ of California San Diego Sch of Med, La Jolla, CA; Robert A. Wild, Oklahoma Univ Health Sciences Ctr, Oklahoma, OK; Yangbo Sun, Univ of Iowa, Iowa, IA; Hailey R. Banack, Jean Wactawski-Wende, State Univ of New York at Buffalo, Buffalo, NY; JoAnn E. Manson, Brigham and Women’s Hosp, Harvard Medical Sch, Boston, NY; Marcia L. Stefanick, Stanford Univ Sch of Med, Stanford, CA; Andrew J. Dannenberg, Weill Cornell Medical Coll, New York, NY; Thomas E. Rohan, Qibin Qi, Albert Einstein Coll of Med, Bronx, NY

Introduction: Excess body weight characterized by higher BMI is associated with increased risk of cardiovascular disease (CVD). In individuals with normal BMI, the extent to which body fat distribution may impact CVD risk is unclear, particularly in postmenopausal women who often experience fat redistribution. Hypothesis: We hypothesized a detrimental impact of trunk fat and a favorable impact of leg fat on risk of CVD risk among postmenopausal women with normal BMI. Methods: We analyzed data from 2683 normal-weight (BMI: 18.5–24.9 kg/m²) women in the Women’s Health Initiative study without known CVD at baseline (1993-1998). Body composition including whole body and regional fat mass (FM) were determined by dual-energy X-ray absorptiometry. Incident CVD events including coronary heart disease (coronary death, nonfatal myocardial infarction, or coronary revascularization) and stroke were ascertained through February 2017. Results: There were 291 incident cases of CVD during a median 17.9 years of follow-up. After multivariable adjustment, whole body FM or FM percentage was not significantly associated with CVD risk. Higher trunk FM percentage was associated with increased risk of CVD (HR comparing extreme quartiles = 1.91, 95% CI: 1.33-2.74, P-trend <0.001), while higher leg FM percentage was associated with lower risk of CVD (HR = 0.62, 95% CI: 0.43-0.89, P-trend = 0.008) (Figure). These associations were slightly attenuated but remained significant after further adjustment for waist circumference or waist-to-hip ratio. Higher trunk fat combined with lower leg fat was associated with particularly higher risk of CVD (HR comparing extreme groups = 3.33, 95% CI: 1.46-7.62). Similar significant associations of trunk fat and leg fat were observed for coronary heart disease but not for stroke. Conclusions: Among postmenopausal women with normal BMI, higher trunk fat was associated with increased risk of CVD, while higher leg fat was associated with decreased risk of CVD, independently of central adiposity measures.

**Gaps in Provider Lifestyle Counseling and Its Adherence Among Obese Adults With Diabetes in the United States**

Ehimen Aneni, Javier Valero-Elizondo, Yale Univ Sch of Med, New Haven, CT; Chukwuemeka U Osondu, Baptist Health South Florida, Miami, FL; Eric J Brandt, Khurram Nasir, Yale Univ Sch of Med, New Haven, CT

**Introduction:** The 2013 ACC/AHA guidelines on the management of obesity in adults strongly recommend lifestyle counseling on calorie restriction, improved physical activity and referral to a weight loss program for obese adults who are likely to benefit from them. This study assessed clinician adherence to these guidelines and the compliance with this advice among obese adults with diabetes in the United States. **Methods:** We utilized the National Health Interview Survey (2016 -2017) for this study. Individuals were asked if in the last 12 months, they had been told to reduce caloric intake, increase physical activity, or if they had been referred to a weight loss program by their health provider. For those who said yes, they were asked if they had taken the advice of the provider. We analyzed the frequencies of these questions and the compliance with this advice among obese individuals with diabetes. **Results:** Among those who were mildly obese (BMI 30 -34.9kg/m², N=1,502), approximately 37% and 40% were not counseled on caloric restriction and increasing physical activity respectively. Among the morbid obese with diabetes (BMI ≥35 kg/m², N=1,670), this number was approximately 28% for both caloric restriction and increasing physical activity. Referral for a weight loss program was very low: 21% and 32% in mild and morbidly obese with diabetes. Among those referred, only approximately 30% enrolled in a weight loss program. In subgroup analyses, females, persons with public insurance or who lacked insurance, low-income earners and those with 10+ years from their diabetes diagnosis were less likely to be counseled about any 2 of these lifestyle changes. **Conclusions** Lifestyle counseling and its compliance among obese adults with diabetes in the United States is still suboptimal and shows disparities by gender and socioeconomic status. This study highlights the gaps in the implementation of the AHA/ACC 2013 guidelines on management of obesity among adults particularly among those with diabetes who will derive the greatest benefit.

**Diurnal Patterns of Physical Activity and Cardiovascular Risk Factors Over 10 Years: Results From the Coronary Artery Risk Development in Young Adults Study**
Amanda E. Paluch, Northwestern Univ Feinberg Sch of Med, Chicago, IL; Kelley Pettee Gabriel, Univ of Texas Health Science Ctr at Houston, Sch of Public Health - Austin Campus, Austin, TX; Samantha Montag, Juned Siddique, Northwestern Univ Feinberg Sch of Med, Chicago, IL; Pamela Schreiner, Univ of Minnesota, Minneapolis, MN; Cora E Lewis, Gareth Dutton, Univ of Alabama at Birmingham, Birmingham, AL; Barbara Sternfeld, Steve Sidney, Kaiser Permanente, Oakland, CA; Jared Reis, Natl Heart, Lung, and Blood Inst, Bethesda, MD; Mercedes Carnethon, Northwestern Univ Feinberg Sch of Med, Chicago, IL

Introduction: Moderate to vigorous intensity physical activity (MVPA) is associated with lower cardiovascular (CV) disease risk. Cross-sectional studies has shown beneficial associations of morning MVPA with CV risk factors. We hypothesized that participants aged 38-50 yrs accumulating a greater proportion of MVPA earlier in the day will have lower risk of obesity, diabetes, and hypertension 10 years later.

Methods: We included CARDIA participants with valid (≥4 of 7 days with ≥10 hr/d) accelerometer wear (ActiGraph 7164) at the year 20 exam (2005-2006) who performed at least 10 min/d MVPA (≥2020 counts per minute). Diurnal patterns were calculated from individual waking time, based on the first valid minute of wear after 4 AM. Diurnal patterns were operationalized as: 1) cumulative percent of MVPA counts within 4 hours after waking, and 2) time after waking when accumulating 50% MVPA was. Logistic regression estimated odds of obesity, diabetes, and stage 2 hypertension and generalized linear models estimated the prevalence risk of stage 1 or above hypertension at the year 25 or 30 exam.

Results: Participants (aged 45.2±3.6 yrs, 57.8% women) averaged 33.7±24.1 min/d MVPA, 34.1±1.3% MVPA was accumulated within 4 hours of waking, and 50% of MVPA was accumulated by 7.2±2.2 hours after waking. There were no statistically significant associations of diurnal patterns with obesity or hypertension (Table). However, every 10% greater MVPA accumulated within the first 4 hours was associated with a 20% higher odds of diabetes. Similarly, every 1 hour earlier accumulating 50% of MVPA was associated with 15% higher odds of diabetes. Total MVPA (min/d) was inversely associated with diabetes, obesity, and stage 2 hypertension.

Conclusions: Total volume of MVPA is more important for cardiometabolic health than the time of day at which it is performed. In regards to diabetes risk, our findings showing higher odds with earlier accumulation of MVPA may be suggestive of a benefit in spreading activity throughout the entire day.


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MP32

Mid-Life Fitness and Plasma Markers of Alzheimer’s Pathology

Mini E Jacob, UT Health San Antonio, San Antonio, TX; Adrienne O'Donnell, Boston Univ, Boston, MA; Claudia Satizabal, UT Health San Antonio, San Antonio, TX; Matthew Pase, The Florey Inst for Neuroscience and Mental Health,
Introduction: Motor function in older adults is known to correlate with neurodegenerative changes and Alzheimer’s Disease (AD) pathology in the brain, however the relationship between mid-life fitness and AD pathology is unknown. AD pathology accumulates early and is difficult to measure; precise estimation requires brain imaging not accessible beyond research settings. Plasma Amyloid and Tau, on the other hand are easy to measure, and are markers of AD pathology and neuronal loss. We tested the association between physical fitness measures in mid-life (gait speed, grip strength and chair stand speed) and plasma markers of AD in the Framingham Heart Study (FHS) Offspring cohort. If these measures correlate with and predict plasma measures of AD burden, these could potentially be used to screen for risk of dementia.

Hypothesis: We hypothesized that superior physical fitness will be cross-sectionally associated with higher plasma Aβ42 and lower Tau; also, that physical fitness measures will be longitudinally associated with Tau measured at a later exam.

Methods: The FHS Offspring cohort had plasma Aβ40 and Aβ42 measured at their 7th clinic exam (1998-01) and plasma total Tau measured at Exam 8 (2005-08). They had grip strength, gait speed and chair stand speed measured at Exam 7, and grip strength and gait speed measured at Exam 8. Grip strength was measured using the Jamar dynamometer, fast gait speed was measured over a 4-meter walkway and chair stand speed was assessed by asking the participants to stand up and down five times, as quickly as they can with their hands folded across their chest. Quantification of Aβ isoforms in plasma was performed using INNO-BIA assays and tau using Single Molecule Array technology. We used linear regression models to examine the association between physical fitness measures and plasma markers of AD adjusting for known confounders (diabetes, cardiovascular disease, atrial fibrillation, smoking, APOE4, systolic blood pressure, waist-to-hip ratio, total cholesterol level, physical activity index, and plasma homocysteine).

Results: In this sample of 1886 community living adults (mean age 61, 54% women), hand grip strength was independently associated with plasma Aβ40 (Beta coefficient -0.28; SD 0.10; p value 0.003) and plasma Tau measured 5 years later (Beta coefficient -0.003; SD 0.001; p value 0.001). Gait speed and chair stand speed demonstrated associations with Aβ40 and total Tau which were attenuated by vascular risk factors.

Conclusions: Hand grip strength is associated with AD pathology. Grip strength measurement could be a valid screening tool for identifying individuals at a higher risk for AD alongside other validated markers. Future research should examine the correlation between grip strength and AD burden measured by PET imaging.


Funding: No

Funding Component:

MP33


Layton Reesor, Rosenda Murillo, Ashley Dao, Daphne C. Hernandez, Univ of Houston, Houston, TX

Introduction: Research has consistently identified the health benefits of physical activity (PA) and that low-income populations engage in less PA than their more affluent counterparts
and may differ by gender. However, research has focused on leisure time PA (LTPA) with less emphasis on PA engagement from employment and transportation. This study aims to determine if those in lower Federal Poverty Level (FPL) categories differ in their modes of PA engagement compared to those of higher FPL categories. **Hypothesis:** We hypothesized that individuals of lower FPL status would be more likely to meet PA guidelines (≥150 minutes moderate to vigorous PA) from employment and transportation PA and less likely to meet PA guidelines from LTPA compared to those of higher FPL status.

**Methods:** We used cross-sectional data from NHANES 2007-2014 participants aged 21 to 59 years (females: n = 6,736; males: n = 6,047). Weighted logistic regression models were used to estimate the association between FPL (FPL ≤ 0.99, 1.00-1.99, 2.00-2.99 vs FPL ≥ 3.00) and meeting PA guidelines in three domains: employment, transportation, and LTPA. Models were stratified by sex and adjusted for weight status, age, race, nativity, marital status, education, employment, and health insurance.

**Results:** Among women, those of lower FPL had increased odds of meeting PA guidelines from employment [(FPL ≤ 0.99: OR: 1.53; 95% CI: 1.13, 2.06), (FPL 1.00-1.99: OR: 1.41; 95% CI: 1.07, 1.88)]. Those in the 2.00-2.99 FPL category had similar odds of meeting PA guidelines from employment (OR: 1.39; 95% CI: 0.99, 1.94), compared to those FPL ≥ 3.00. Women of lower FPL had similar odds of meeting PA guidelines from transportation compared to those FPL ≥ 3.00 (p > .05). Further, women of lower FPL were significantly less likely to meet PA recommendations from LTPA [(FPL ≤ 0.99: OR: 0.47; 95% CI: 0.39, 0.57), (FPL 1.00-1.99: OR: 0.51; 95% CI: 0.41, 0.62), (FPL 2.00-2.99: OR: 0.72; 95% CI: 0.58, 0.90)]. Among men, only those in the 2.00-2.99 category having increased odds of meeting PA guidelines from employment (OR: 1.49; 95% CI: 1.19, 1.86). Only the lowest FPL category men (FPL ≤ 0.99) had increased odds of meeting PA guidelines from transportation (OR: 1.80; 95% CI: 1.29, 2.51). Similar to women, lower FPL men were significantly less likely to meet PA recommendations from LTPA [(FPL ≤ 0.99: OR: 0.63; 95% CI: 0.51, 0.79), (FPL 1.00-1.99: OR: 0.58; 95% CI: 0.48, 0.70), (FPL 2.00-2.99: OR: 0.68; 95% CI: 0.55, 0.84)]. **Conclusions:** These findings suggest that modes of PA engagement differ by FPL category among men and women. Researchers studying PA among low-income populations must assess employment and transportation PA in addition to LTPA in order to accurately estimate PA engagement. Practitioners attempting to increase PA among low-income populations need to consider other modes of PA rather than solely focusing on LTPA.

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**MP34**

**Associations Muscle Quality, Muscle Strength, and Muscle Mass With All-Cause Mortality in Elderly Men and Women**

Chong-Do Lee, Samuel Lee, Arizona State Univ, Queen Creek, AZ

Although muscle mass, muscle strength, and muscle quality are important risk factors for disability and mortality in elderly men and women, the associations of these variables with all-cause mortality remain less explored. **PURPOSE:** We investigated the associations of muscle quality, muscle strength, and muscle mass with all-cause mortality in elderly US men and women. We also compared the strength of these associations with all-cause mortality. **METHODS:** Cox proportional hazards regression was used to examine the associations of muscle quality, muscle strength, and muscle mass with all-cause mortality. **RESULTS:** Cox proportional hazards regression was used to examine the associations of muscle quality, muscle strength, and muscle mass with all-cause mortality. **CONCLUSIONS:** These findings suggest that modes of PA engagement differ by FPL category among men and women. Researchers studying PA among low-income populations must assess employment and transportation PA in addition to LTPA in order to accurately estimate PA engagement. Practitioners attempting to increase PA among low-income populations need to consider other modes of PA rather than solely focusing on LTPA.
Examination Survey 1999-2002. All participants completed baseline lifestyle factors, and muscle strength and muscle mass measurements. Body composition was estimated by Dual-energy X-ray absorptiometry. Appendicular skeletal muscle mass (SMS) was computed by combining lean tissues in both arms and legs, and relative muscle mass was computed as SMS divided by height in meters squared (AMS). Leg muscle strength (MST) was estimated using the Kin Com MP dynamometer. Leg muscle quality (MQI) was computed as the peak force (Newton) divided by lean mass in the right leg.

We further categorized AMS, MST, and MQI as sex-specific quartile categories. The significance of AMS, MST, and MQI with all-cause mortality was also tested by the Cox hazards models with the likelihood ratio statistics with and without adjustment for multiple risk factors. RESULTS: During an average of 9.8 years of follow-up (9,4687 person-years), there were a total of 372 all-cause deaths (85 CVD, 202 chronic diseases). After adjustment for multiple risk factors, the risks of all-cause mortality across MQI quartile categories were (95% CI) 1.00 (Q1, referent), 0.72 (0.55, 0.95), 0.66 (0.49, 0.90), and 0.50 (0.31, 0.80) (P for trend <0.001). The risks of all-cause mortality across MST categories were (95% CI) 1.00 (Q1, referent), 0.85 (0.59, 1.21), 0.50 (0.33, 0.75), and 0.46 (0.31, 0.67) (P for trend <0.001). The risks of all-cause mortality across AMS categories were (95% CI) 1.00 (Q1, referent), 0.77 (0.56, 1.07), 0.75 (0.52, 1.10), and 0.65 (0.47, 0.90) (P for trend = 0.01). As a single measure, after adjustment for multiple risk factors, the hazards for all-cause mortality across MQI, MST, and AMS were 0.97 (p<0.001), 0.99 (p<0.001), and 0.84 (p = 0.001), respectively. When we included all these variables in the fully-adjusted model, only MQI (p = 0.03) was a strong risk factor for all-cause mortality, but not for MST (p = 0.84) and AMS (p = 0.05). CONCLUSION: Muscle quality was a strong risk factor for all-cause mortality in elderly men and women when compared with muscle strength or relative muscle mass. The American Heart Association should emphasize the importance of improving muscle quality in this geriatric population.

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MP35

**Physical Activity and Risk of Cardiovascular Events and All-Cause Mortality Among Kidney Transplant Recipients**

Augustine Kang, Hongseok Kim, Brown Univ, Providence, RI; Carol E Garber, Columbia Univ, New York, NY; Charles Eaton, Patricia M Risica, Brown Univ, Providence, RI; Andrew G. Bostom, Rhode Island Hosp, Providence, RI

**Introduction:** Insufficient physical activity (PA) may increase the risk of all-cause mortality and cardiovascular disease (CVD) morbidity and mortality among kidney transplant recipients (KTRs), but limited research is available. We examine the relationship between PA and the development of CVD events and all-cause mortality among a cohort of KTRs.

**Methods:** N = 4377 participants were examined from a large, multiethnic, multicenter trial (37% female; mean age 51.9 ± 9.4 years; 75% White; 20% with prevalent CVD). PA was measured at baseline and was derived from a modified PA summary score from the Yale Physical Activity Survey (YPAS) and divided into tertiles (T1, T2, T3), from lowest to highest PA. Kaplan-Meier survival curves were used to graph the risk of CVD events and all-cause mortality between PA tertiles. Cox proportional hazards regression models were constructed to examine the association of baseline PA levels with CVD events (e.g. stroke, myocardial infarction, CVD death) and all-cause mortality over time. There was no violation of the proportional hazards assumption. Covariates include age, sex, race, smoking status, diastolic blood pressure, blood lipids, BMI, transplant vintage, and donor type.
Results: Participants were followed up to 2,500 days. The cohort reported 486 CVD events and 419 deaths. Fully adjusted models revealed that compared to the lowest tertile, the highest tertile had significantly lower risk of: CVD events (HR, 0.628, 95% CI, 0.499-0.790) and all-cause mortality (HR, 0.533, 95% CI, 0.414-0.688). Compared to middle T2 scores, T3 of PA scores had significantly lower: risk of CVD events (HR, 0.709, 95% CI, 0.563-0.895) and all-cause mortality (HR, 0.635, 95% CI, 0.491-0.822). Results were similar in unadjusted models.

Conclusion: Physical activity was associated in a dose-response manner with a reduced risk of CVD events and all-cause mortality in kidney transplant recipients. These observed associations in a large, international sample of KTRs, even when controlling for traditional CVD risk factors, indicate the potential importance of PA in reducing CVD and death among KTRs. Future work to confirm these associations and to determine whether increasing PA will reduce risk in KTRs is needed, which may help inform if PA should be integrated into lifestyle management strategies among KTRs.


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MP36

Trends and Correlates of Physical Activity and Dietary Counseling for Adults With Cardiovascular Risk Factors: Medical Expenditure Panel Survey 2002-20015

Felipe Lobelo, Tianyi Zhuo, Jeniffer Frediani, Emory Univ, Atlanta, GA

Background: In 2014 the United States Preventive Services Task Force (USPSTF) recommended offering overweight adults with additional cardiovascular disease (CVD) risk factors behavioral counseling to promote a healthful diet and physical activity (PA).

Methods: Self-reported receipt of counseling, CVD risk (overweight/obesity, diabetes, smoking, high cholesterol and blood pressure) for adults were extracted from the Medical Expenditure Panel Survey (MEPS) household component (HC) 2002-2015. Prevalence rates for PA+diet counseling were calculated, adjusted by age, gender, insurance type, race/ethnicity, region, marital status, educational level, family income, number of health visits and CVD risk factors. To assess trends, we computed prevalence ratios (PR) at three time-points: 2002/03, 2009/10 and 2014/15, controlling for socio-demographics. Correlates of PA/diet counseling for 2014/15 were explored using adjusted PR. Results: The MEPS-HC response rate averaged 57.1% and included 116,048 observations across the 14-year period. The adjusted PA/diet counseling prevalence ranged from 43% to 63% (Figure 1). Compared to the 2002/03, PA+diet counseling increased in 2009/10 (PR=1.09 (1.07-1.12)). In 2014/15, compared to adults with private insurance, those with no insurance or Medicare reported lower PA+diet counseling (PR=0.91 (0.84-0.99); PR=0.77; (0.73-0.82), respectively). Females (PR=1.07 (1.03-1.11) and racial minorities reported higher PA+diet counseling (PR=1.31 (1.24-1.38); PR=1.11 (1.05-1.18); PR=1.12 (1.01-1.24), for Hispanic, Black and Asians, respectively). Compared to adults with 2 CVD risk factors, those with 3, 4 or 5 CVD risk factors reported higher PA+diet counseling (PR=1.46 (1.39-1.54); PR=1.74 (1.63-1.85); PR=1.89 (1.67-2.15), respectively). Conclusions: Modest increases in PA and diet counseling have occurred, primarily before ACA passing. However, half of eligible patients report not receiving counseling, particularly those with no insurance or Medicare.
Introduction: Hypertension is a major risk factor for CVD affecting 34% of American adults. High sodium (Na) intake is identified as a modifiable risk factor for high blood pressure, but our ability to assess Na intake is poor. The gold standard is to measure Na excretion in a 24h urine collection, but this is burdensome. An alternative method is to predict 24h Na excretion from a spot urine sample. However, we do not know how well predicted 24h Na excretion reflects intake, the true outcome of interest, or the ideal time to collect a spot urine sample. These gaps can only be filled using a controlled feeding study in which intake is known and timing of urine collections is controlled.

Hypothesis: We hypothesized that, with currently available equations, 24h Na excretion predicted from spot urine samples will not accurately reflect intake.

Methods: This is a secondary analysis of a randomized, multi-phase, crossover, full-feeding trial in healthy adults (n = 39, aged 29.7 ± 11.2 y). Data from the two control phases were used in which dietary intake and testing conditions were identical. Participants ate three meals in a clinic setting and spot urine samples were collected every 2 hours as part of a 24h collection. Urine samples were analyzed for sodium, potassium, and creatinine. The INTERSALT equations were used to predict 24h Na excretion from each of the 9 spot urine samples collected. Predicted 24h Na excretion values were compared with observed 24h excretion and known dietary intake using repeated measures ANOVA. Intra-class correlations for each timed spot urine sample were calculated to determine the variability in average spot urine Na excretion between the two control phases.

Results: Predicted 24h Na excretion using the spot urines at hour 10, 12, overnight, and early morning collection were not significantly different from observed 24h Na excretion (all p ≥ 0.21). However, predicted 24h Na excretion underestimates observed 24h Na excretion by about >600 mg. Importantly, all predicted 24h excretions as well as observed 24h excretion were significantly lower than intake by >1000 mg (all p < 0.001). Intraclass correlations were significant at hour 0, 2, 8, 12, and evening/overnight (all p < 0.05), suggesting low day-to-day variability in Na excretion at these times.

Conclusions: Regardless of time of spot urine collection, predicted 24h Na excretion is lower than Na intake, suggesting currently-available equations do not provide adequate estimates of Na intake. The next step is to develop equations to accurately predict Na intake from a controlled feeding study model using spot urine samples collected at a time when Na excretion is consistent from day to day. These improved equations could be used to implement effective
dietary interventions to reduce blood pressure and CVD risk.

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Funding: No

Funding Component:

**MP38**

**Association of Changes in Plant-Based Diet Indices with Total and Cause-Specific Mortality**


**Introduction:** Plant-based diets have been associated with health benefits, including lower risk of type 2 diabetes (T2D) and coronary heart disease (CHD). However, the association between plant-based diets and mortality remains unclear as previous studies did not take into account the quality of plant-based foods. To overcome this limitation, we recently developed three plant-based diet indices—an overall plant-based diet index (PDI), a healthful plant-based diet index (hPDI), and an unhealthful plant-based diet index (uPDI), emphasizing processed carbohydrates and fats—and reported that hPDI and uPDI were differentially associated with T2D and CHD. In this study, we investigate associations between long-term changes in plant-based diet indices and subsequent total and cause-specific mortality in the Nurses’ Health Study (NHS) and the Health Professionals Follow-Up Study (HPFS).

**Hypothesis:** We hypothesized that improved plant-based diet quality is associated with lower total and cardiovascular disease (CVD) mortality.

**Method:** We included 47,983 women, aged 63±7y (mean±SD) in the NHS and 25,737 men, aged 63±9y in the HPFS who had no history of CVD or cancer on or before 1998 (baseline). We used multivariable Cox proportional-hazards regression to assess the association between 12-y pre-baseline changes (1986-1998) in three plant-based diet indices and subsequent total and cause-specific mortality (1998-2014). We adjusted for age, race, initial corresponding plant-based diet index score, BMI, family history of diabetes, myocardial infarction, or cancer, history of hypertension, hypercholesterolemia, or T2D, medications, postmenopausal status and postmenopausal hormone use in women, initial and 12-y pre-baseline changes in weight and other lifestyle-related factors.

**Results:** Compared with those participants whose diets remained relatively stable during the pre-baseline 12-year period, among participants with the greatest increase in plant-based diet indices, the pooled hazard ratio (95% confidence interval [CI]) for total mortality was 0.92 (95% CI, 0.87 to 0.97) for PDI, 0.90 (95% CI, 0.86 to 0.95) for hPDI, and 1.11 (95% CI, 1.05 to 1.16) for uPDI. For CVD-specific mortality, a 10-point increase in hPDI was associated with a 10% lower risk (95% CI, 5 to 15), while a 10-point increase in uPDI was associated with a 6% higher risk (95% CI, 0 to 12). We found no evidence for changes in plant-based diet indices and subsequent risk of cancer mortality.

**Conclusions:** Improved plant-based diet quality over a 12-year period was associated with a lower risk of total and CVD mortality, whereas
Increased consumption of an unhealthful plant-based diet was associated with a higher risk of total and CVD mortality.

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MP39

**Association of MIND Diet Adherence With Brain Volume, Silent Brain Infarcts and Brain Atrophy in the Framingham Heart Study**


**Objective** Adherence to the Mediterranean-DASH for Neurodegenerative Delay (MIND) diet has previously been associated with cognitive decline and dementia. To our knowledge, no prior study has investigated the association between the MIND diet and measures of brain volume, silent brain infarcts (SBIs) or brain atrophy. **Methods** We aimed to evaluate, cross-sectionally and longitudinally, whether consumption of a diet consistent with the MIND diet was associated with larger brain volumes, fewer SBIs and fewer atrophy in the community-based Framingham Heart Study. We included 1,904 participants (mean age 69 (SD, 9)) who completed a brain MRI and a validated food frequency questionnaire (FFQ). The MIND diet consists of 10 healthy and five unhealthy components (range: 0-15). A cumulative MIND diet score was calculated by averaging across three FFQs (exams 5 (1991-1995), 6 (1995-1998), and 7 (1998-2001)). From the total study population, 86% completed all three FFQs. Brain MRI was performed proximal to exam 7 and again after a mean of 7 years (SD, 1.1) (n=1,317). Total brain volume (TBV), hippocampal volume (HPV), white matter hyperintensity volume (WMHV), expressed as a percentage of total cranial volume, and presence of SBIs were assessed from MRI scans. We used multivariable linear (TBV, HPV and WMHV) and logistic (SBIs) regressions for the cross-sectional analyses, and we analyzed the annualized change of TBV and HPV as atrophy measures using multivariable linear regression. **Results** In cross-sectional analyses, higher MIND diet scores were significantly associated with larger TBV (β±SE, +0.09±0.04; p=0.03) after adjustment for basic demographic factors, total daily energy intake, and APOE e4 allele status, but was not associated with HPV (+0.001±0.001; p=0.09), WMHV (-0.01±0.01; p=0.27), SBIs (OR (95%CI), +1.01, 0.92-1.10; p=0.61) or atrophy (TBV, -0.001±0.01; p=0.88; HPV, -0.0003±0.001; p=0.62). After additional adjustments for cardiovascular risk factors the association with TBV was attenuated (+0.05±0.04; p=0.17). Significant interactions were observed for HPV by APOE e4 status and BMI in the basic model. After stratification by APOE e4 status, higher MIND diet scores were significantly associated with higher HPV among APOE e4 non-carriers (+0.002±0.001; p=0.01) but not carriers (n=412). After stratification by BMI, higher adherence to the MIND diet was associated with larger HPV among participants with a BMI above 25.
(+0.002±0.001; p=0.01), but not among participants with a BMI below 25. **Conclusions** Higher adherence to the MIND diet was not independently associated with brain volume measures, SBIs or brain atrophy in our community cohort as the associations appeared to be mediated by cardiovascular risk factors. In addition, we observed that adherence to the diet was associated with larger brain volume measures in sub groups. Replication is needed to confirm our findings.

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**MP40**

**Higher Intakes of Animal Protein Helps Maintain Functional Status and Grip Strength in Older Adults in the Framingham Offspring Study**

**Mengjie Yuan, Richard T. Pickering, Martha R. Singer, Margaret L. Bradlee, Lynn L. Moore, Boston Univ Medical Sch, Boston, MA**

Introduction: Dietary protein has been shown to prevent age-related functional decline and strength loss, but few studies have examined the separate effects of animal and plant proteins on these outcomes. **Hypothesis:** We hypothesized that animal protein might provide greater protection against strength loss and functional decline than plant protein in older adults (aged ≥ 50 years) in the Framingham Offspring Study (FOS). **Methods:** Dietary protein was assessed using 3-day diet records at exams 3 and 5 in the prospective FOS; intakes were adjusted for body weight using the residual method. Functional status scores (median follow-up 17.3 years) was derived from standardized questionnaires at exams 5-9, while grip strength (median follow-up 10.3 years) was measured by hand-held dynamometer at exams 7-9. Multivariable analyses included Cox proportional hazards modeling, repeated-measures mixed models, and analysis of covariance to adjust for sex, age, education, percent of calories from saturated fats, and physical activity. Models for animal protein were adjusted for plant protein intake and vice versa. Results: Subjects were categorized into 3 categories of sex-specific intakes of animal protein (<50, 50-<70, and ≥70 g/day for men; <45, 45-<65, and ≥65 g/day for women) and plant protein (<20, 20-<26 and ≥26 g/day for men; <17, 17-<22, and ≥22 g/day for women). At the end of follow-up, those with the highest (vs. lowest) animal protein intakes maintained the highest functional status levels (functional score: 20.4 vs.19.0, respectively p=0.0036). Similar results were observed for plant proteins (20.2 vs.18.4 for highest vs. lowest intakes, p <.0001). In stratified analyses, higher intakes of both animal and plant proteins, especially in combination with higher levels of activity, were associated with greater preservation of functional status over time. Among more sedentary individuals, dietary protein alone (from both animal and plant sources) protected against functional decline over time (p=0.0015 and p=0.0008 for animal and plant protein, respectively). For grip strength, however, only animal protein protected against decline over 10.3 years (change in grip strength: -0.41 vs. -0.60 kg/yr for highest vs. lowest intakes in men, p=0.0273; -0.15 vs. -0.29 kg/yr for highest vs. lowest intakes in women, p=0.0487). Higher plant protein intake was not associated preservation of grip strength over time. **Conclusions:** Higher intakes of both animal and plant protein were protective of self-reported functional status in these analyses while only animal protein was associated with the preservation of grip strength among older adults.
INTRODUCTION When dietary carbohydrate replaces fat, HDL cholesterol (HDL-C) and the primary HDL protein apolipoprotein A1 (apoA1) decrease. The proportion in plasma of large HDL2 decreases while small HDL3 increases. These findings suggest that diet affects metabolically important attributes of HDL that produce the size changes. We studied in humans the effect of dietary carbohydrate and unsaturated fat on the HDL proteome and metabolism of 9 HDL proteins across 5 HDL sizes.

METHODS AND RESULTS Twelve participants were placed on a healthy, controlled diet high in unsaturated fat (HF) or high in carbohydrate (HC) in a randomized crossover design. At the end of each 4-week diet period, subjects were infused with a stable isotope tracer (D3-Leu) in order to label all newly synthesized HDL proteins. Blood samples were collected and tracer was followed for 70 hrs post-infusion. ApoA1-HDL was isolated by immunoaffinity purification, separated into 5 HDL particle sizes, and prepared for analysis by mass spectrometry. We used label free quantification to characterize the HDL proteome. The proteome composition and distribution across the 5 HDL sizes were remarkably conserved in all subjects on both diets. Diet altered the abundance of several proteins on the major HDL sizes alpha2 and alpha3. The HC diet increased proteins involved in lipid metabolism (apoC3, apoA2) and decreased antioxidant (PON1, PON3) and protease inhibitor (SERPINA3, SERPING1) proteins. We also monitored the metabolism of 9 proteins that likely affect HDL metabolism - apoA1, apoA2, apoA4, apoC3, apoE, apoJ, apoL1, apoM and LCAT. We used parallel reaction monitoring and XPI software to measure the amount of D3-Leu tracer over time in these 9 proteins across the 5 HDL sizes. We found that the HC diet increased apoA2 and apoJ and decreased apoA1 pool sizes on large HDL. The HC diet also increased apoM turnover in large HDL, and apoA1, apoA2, and apoE turnover across the HDL size range.

CONCLUSIONS Dietary carbohydrate when it replaces unsaturated fat alters the HDL proteome and metabolism of several HDL proteins on specific HDL sizes. Carbohydrate increases the abundance of proteins involved in lipid metabolism, decreases antioxidant and protease inhibitor proteins, and accelerates turnover of apoA1, apoA2, apoE, and apoM. This study suggests that diet modulates HDL function by affecting HDL composition and the metabolism of major HDL proteins.
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MP42

Association of Taste Perception for Sweet, Salt, Sour, Bitter and Umami With Fruit and Vegetable Intake Among Community-dwelling Men and Women in the PREDIMED-PLUS Trial


Introduction: Emerging evidence suggests that differences in the ability to perceive individual tastes; sweet, salt, sour, bitter and umami, may influence food intake - amount and variety, thereby influencing diet quality, energy balance and cardiometabolic disorders.

Objective: To explore the relationship between perception of each taste and intake of different categories of fruits and vegetables. We hypothesized that greater perception of each taste will be inversely associated with amount consumed.

Methods: A cross-sectional analysis was performed on baseline data from participants (N=379) in the University of Valencia center of the PREDIMED-PLUS Clinical Trial; a multi-center weight-loss primary prevention trial of cardiovascular disease, among community-dwelling adults in Spain aged 55-75y diagnosed with metabolic syndrome. Taste perception was determined by challenging subjects with solutions of standard tastants representing sweet, salt, sour, bitter, and umami (400 mM sucrose, 200 mM NaCl, 34 mM citric acid, 5.6 mM phenylthiocarbamide [PTC], 200 mM monopotassium glutamate, respectively). Taste perception intensities were evaluated on a 0-5 scale. Food intake was assessed using a validated food frequency questionnaire. Outcomes included fruit and vegetable intake (servings/week), total and sub-groups (citrus and non-citrus fruits; cruciferous and non-cruciferous vegetables). Multivariable linear regression models were used to assess relationships between perception of each tastant and number of servings/week consumed, for total and square root-transformed sub-groups.

Results: In the fully-adjusted models, controlling for sex, age, diabetes, smoking status, daily physical activity and weekly energy intake, there were inverse associations between sweet perception and intake of citrus fruit (β=-0.5; p<0.01) and total vegetables (β=-1.1; 95% CI [-2.0, -0.2]), particularly non-cruciferous vegetables (β=-1.0; p=0.02); and positive associations between salt perception and intake of total fruit (β=0.9; 95% CI [0.02, 1.7]), particularly non-citrus fruit (β=0.6; p=0.03), sour perception and intake of cruciferous vegetables (β=0.1; p=0.04) and umami perception and intake of non-cruciferous vegetables (β=0.7; p=0.04). No significant associations were observed between bitter taste perception and fruit or vegetable intake.

Conclusion: This marks the first exploration of taste perception as a determinant of fruit and vegetable intake among community-dwelling adults. Perception for each tastant differentially affected the amount and type of fruits and vegetables consumed, with sweet, salt, sour and umami perception emerging as significant predictors. These findings support a role of taste perception in guiding the amount and type of foods consumed, albeit in a more complex manner than originally hypothesized.

Disclosures: J.E. Gervis: None. O. Coltell: None. R. Fernández-Carrión: None. E.M.
Monounsaturated Fatty Acids From Plant or Animal Sources and Risk of Type 2 Diabetes in Three Large Prospective Cohorts of Men and Women

Frank Qian, Harvard T.H. Chan Sch of Public Health, Boston, MA; Geng Zong, Chinese Acad of Sciences, Beijing, China; Yanping Li, Qi Sun, Harvard T.H. Chan Sch of Public Health, Boston, MA

**Background** Existing evidence on the relationship between intakes of monounsaturated fatty acids (MUFAs) and risk of developing type 2 diabetes (T2D) is conflicting. Few studies have examined whether MUFAs from plant or animal sources exhibit differential associations with T2D. **Aims** To examine the association of intake of total, plant-based (MUFA-Ps), and animal-based MUFAs (MUFA-As) with T2D risk. **Methods** We used data from three prospective cohorts which included 54,518 women in Nurses’ Health Study (1990-2012), 88,613 women in Nurses’ Health Study II (1991-2013), and 29,520 men in Health Professionals Follow-up Study (1990-2012). Using validated food-frequency questionnaires and food composition tables, we calculated the average MUFA-Ps and MUFA-As intake in every 4-year period and modeled their association with T2D using Cox regression models. **Results** During 3,682,622 person-years of follow-up, we documented 13,077 incident cases of T2D. After multivariate adjustment, total MUFA intake was not associated with risk of T2D. In contrast, MUFA-Ps were associated with a lower risk of T2D, whereas MUFA-As were associated with a higher risk. In iso-caloric substitution analyses, the pooled hazard ratios (HRs) and 95% confidence intervals (CI) were 0.99 (0.88, 1.12; P=0.89) for saturated fat (SFAs, 5% of energy), 0.91 (0.85, 0.98; P=0.01) for refined carbohydrates (5% of energy), and 0.87 (0.80, 0.94; P=0.0006) for trans fats (2% of energy), when replaced by MUFA-Ps (Table 1). Additionally, the HRs (95% CIs) were 0.67 (0.61, 0.73; P<0.0001) and 0.78 (0.73, 0.83; P<0.0001), respectively, for replacing 5% of energy in MUFA-As or the sum of SFAs and MUFA-As with MUFA-Ps. **Conclusion** In three large prospective cohort studies, higher intakes of MUFA-Ps were associated with a lower risk of T2D, whereas increased intakes of MUFA-As was associated with higher risk. Replacing refined carbohydrates, trans fats, and MUFA-As with MUFA-Ps may be beneficial for the prevention of T2D.

Disclosures: F. Qian: None. G. Zong: B. Research Grant; Significant; Postdoctoral fellowship funded by Unilever R&D. Y. Li: None. Q. Sun: None.
**Introduction:** High-sensitivity cardiac troponin (hs-cTnT) is a marker of myocardial damage and has been associated with diabetes and its major complications, particularly those with a microvascular etiology. The aim of this study was to assess the association of hs-cTnT and other cardiac, kidney, inflammation, and hyperglycemia biomarkers with peripheral neuropathy (PN) in both diabetic and non-diabetic populations.

**Methods:** We conducted a cross-sectional analysis of 3,019 black and white participants in the ARIC study who underwent monofilament PN testing and had hs-cTnT and other nontraditional measures [NT-proBNP, high-sensitivity C-reactive protein, β-2 microglobulin, creatinine-based estimated glomerular filtration rate (eGFR), cystatin C-based eGFR, urine albumin:creatinine ratio, fructosamine, glycated albumin, and 1,5-anhydroglucitol] assessed at ARIC visit 6 (2016-2017, age 71-94 years). We used logistic regression models to assess the associations of these biomarkers with the presence of PN in older adults with and without diabetes after adjusting for traditional diabetes and cardiovascular risk factors.

**Results:** Overall, 38.0% of the 3,019 participants had evidence of PN (42.0% in persons with diabetes and 36.4% in persons without diabetes). After adjusting for traditional risk factors, there were significant and robust associations of hs-cTnT, NT-proBNP, and β-2 microglobulin with PN (Table, Model 2). After further adjusting for hemoglobin A1c, only the association of hs-cTnT with PN remained significant (P=0.02; Model 3). Elevated hs-cTnT (≥14 ng/L) was associated with prevalent PN in persons with diabetes (OR 2.10, 95%CI 1.24-3.56) and without diabetes (OR 2.61, 95% CI 1.59-4.28) compared to persons without diabetes and non-elevated hs-cTnT (<6 ng/L).

**Conclusions** Hs-cTnT is associated with the presence of PN in older adults independent of cardiovascular risk factors and glycemic control. These findings support the hypothesis that hs-cTnT may be a global marker of end organ damage.

**Disclosures:** C.W. Hicks: None. D. Wang: None. N. Daya: None. B.G. Windham: None. C.M. Ballantyne: None. K. Matsushita: None. E. Selvin: None.

**Funding:** No

**Funding Component:**

**MP45**

**Cardiovascular Health in Early Adulthood Predicts the Development of Coronary Artery Disease: 25 Year Follow Up in Individuals With Type 1 Diabetes From the Pittsburgh Epidemiology of Diabetes Complications Study**

**Susan M Devaraj,** Univ of Pittsburgh Graduate Sch of Public Health, Pittsburgh, PA

**Introduction:** Coronary artery disease (CAD) is especially burdensome among individuals with type 1 diabetes (TID). The AHA created metrics to monitor cardiovascular health (CVH) to promote primordial prevention. CVH metrics define 3 health behaviors (diet, physical activity, and smoking), and 4 health factors (BMI, total cholesterol, blood pressure and fasting glucose) as ideal, intermediate or poor based on set criteria. These CVH metrics have been shown to
be related to cardiovascular outcomes in the general population. The purpose of this research is to describe the prevalence of CVH metrics in young adults with T1D, a group at particularly high risk for CAD, and assess the hypothesis that more favorable metrics protect against future hard CAD outcomes.

**Methods:**
Data are from the longitudinal Pittsburgh Epidemiology of Diabetes Complications (EDC) study. CVH metrics are defined by an average of measures taken at first visit and first follow up visit (1986-1990, “baseline”) for participants age ≥20 at study entry without prevalent CAD. CVH metrics were scored according to AHA criteria, with HbA1c in place of fasting glucose. Total CVH score (possible range 0-14) is the sum of subscores for each metric where poor=0, intermediate=1 and ideal=2. Cox proportional hazards models were used to assess the association between baseline CVH and CAD incidence during 25 years of follow-up.

**Results:**
Characteristics of the 463 individuals analyzed after exclusions (179 age <20 or prevalent CAD, 15 missing data) are shown in Table 1. No participants achieved ideal status for all 7 CVH metrics. Each unit increase in ideal CVH score was associated with 28% lower risk (95% CI: 0.63–0.82, p<0.01), while each unit increase in total CVH score was associated with 23% lower risk of CAD (95% CI: 0.71–0.84, p<0.01), adjusting for baseline diabetes duration, sex, race, albumin excretion rate, and triglycerides. **Conclusions:** CVH metric scores appear to be predictive of CAD in adults with T1D, demonstrating the value of promoting ideal CVH for CAD prevention.

**Table 1: Participant Characteristics (average of first visit (1986-1990) and first follow up visit (1988-1990), n=463)**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Median (25th and 75th percentile or N(%))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), at first visit</td>
<td>12.1 (10.5, 14.3)</td>
</tr>
<tr>
<td>Diabetes duration (years, at first visit)</td>
<td>2.0 (0.4, 7.7)</td>
</tr>
<tr>
<td>Sex (male)</td>
<td>231 (49.6%)</td>
</tr>
<tr>
<td>Triglycerides (mg/dL)</td>
<td>153 (105, 216)</td>
</tr>
<tr>
<td>HDL cholesterol (mg/dL)</td>
<td>56.2 (43.6, 68.0)</td>
</tr>
<tr>
<td>LDL cholesterol (mg/dL)</td>
<td>104 (85.3, 133.5)</td>
</tr>
<tr>
<td>BP</td>
<td>126/71 (113, 128)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>267 (57.6%)</td>
</tr>
<tr>
<td>All cause mortality</td>
<td>28 (5.7%)</td>
</tr>
<tr>
<td>Death rate (per 1000 person-years)</td>
<td>27.8 (16.5, 43.7)</td>
</tr>
<tr>
<td>Estimated GFR (mL/min/1.73m²)</td>
<td>108 (90.0, 124.0)</td>
</tr>
<tr>
<td>CVH Scores</td>
<td>10.2 (7.6, 14.3)</td>
</tr>
<tr>
<td>Total CVH score (possible range 0-14)</td>
<td>30.2 (25.0, 35.0)</td>
</tr>
<tr>
<td>Ideal CVH score (possible range 0-14)</td>
<td>36.0 (25.0, 35.0)</td>
</tr>
<tr>
<td>Total CVH score (possible range 0-14)</td>
<td>10.2 (7.6, 14.3)</td>
</tr>
<tr>
<td>Ideal CVH score (possible range 0-14)</td>
<td>26.5 (20.0, 35.0)</td>
</tr>
<tr>
<td>Total CVH score (possible range 0-14)</td>
<td>30.2 (25.0, 35.0)</td>
</tr>
<tr>
<td>Ideal CVH score (possible range 0-14)</td>
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</tr>
<tr>
<td>Ideal CVH score (possible range 0-14)</td>
<td>36.0 (25.0, 35.0)</td>
</tr>
</tbody>
</table>

**Disclosures:** S.M. Devaraj: None.

**Funding:** No

**Funding Component:**

**MP46**

**Fasting Glucose Variability in Young Adulthood and Incident Diabetes, Cardiovascular Disease, and Mortality: The Coronary Artery Risk Development in Young Adults (CARDIA) Study**

**Michael Bancks**, Wake Forest Sch of Med, Winston-Salem, NC; April Carson, Cora Lewis, Univ of Alabama at Birmingham, Birmingham, AL; Erica Gunderson, Kaiser Permanente Northern California, Div of Res, Oakland, CA; Jared Reis, Natl Heart, Lung, and Blood Inst, Bethesda, MD; Pamela Schreiner, Univ of Minnesota, Minneapolis, MN; Yuichiro Yano, Duke Univ, Durham, NC; Mercedes Carnethon, Northwestern Univ Feinberg Sch of Med, Chicago, IL
**Introduction:** Whether long-term variability in fasting glucose (FG) independent of incident diabetes mellitus (DM) is associated with incident cardiovascular disease (CVD) and mortality is unclear. **Hypothesis:** Higher variability of FG would be associated with higher risk for incident CVD and mortality as compared with lower FG variability, independent of increases in FG over time and the development of DM. **Methods:** We studied 4210 black and white CARDIA participants, ages 18 to 30 years (1985-1986) at baseline and calculated 2 measures of long-term glucose variability, the coefficient of variation about the mean (CV-FG) and the absolute difference between successive FG measurements (average real variability; ARV-FG) before the onset of DM. We estimated hazard ratios (HR) for incident CVD and mortality over 30 years of follow-up with adjustment for time-varying CVD risk factors. **Results:** There were 417 incident cases of DM, 195 incident CVD events (122,279 person-years) and 237 deaths (123,505 person-years). The HR for incident CVD per 1-standard deviation (1-SD) higher CV-FG was 1.24 (95% confidence interval [CI]: 1.08, 1.42) and for ARV-FG was 1.14 (95% CI: 1.01, 1.28) after adjustment for demographics, baseline FG, change in FG, and time-varying education, smoking, alcohol consumption, body mass index, physical activity, systolic blood pressure (BP), BP medications, low-density lipoprotein cholesterol, cholesterol medications, incident DM, and DM medications (Figure 1A and 1B). HRs for mortality were similar in magnitude for 1-SD ARV-FG (HR: 1.22, 95% CI: 1.10, 1.35) and slightly weaker for CV-FG (HR: 1.12, 95% CI:0.98, 1.27) after adjustment for time-varying CVD risk factors. The majority of mortality and the variability-mortality association was due to non-CVD mortality. Associations were similar in magnitude when restricted to individuals without incident DM. **Conclusion:** Higher intra-individual FG variability during young adulthood before the onset of DM was associated with incident CVD and mortality.

**Disclosures:** **M. Bancks:** None. **A. Carson:** C. Other Research Support; Modest; Amgen, Inc.. **C. Lewis:** None. **E. Gunderson:** C. Other Research Support; Modest; Janssen Pharmaceuticals, Inc.. **J. Reis:** None. **P. Schreiner:** None. **Y. Yano:** None. **M. Carnethon:** None.

**Funding:** No

**Funding Component:**

**MP47**

**Diabetes, Prediabetes, and Short-Term Cardiovascular Risk and Death in Older Adults**

**Olive Tang,** Kunihiro Matsushita, Josef Coresh, A. Richey Sharprett, John W McEvoy, Johns Hopkins Univ, Baltimore, MD; Beverly G. Windham, Univ of Mississippi Medical Ctr, Jackson, MS; Christie M. Ballantyne, Baylor Coll of Med, Houston, TX; Elizabeth Selvin, Johns Hopkins Univ, Baltimore, MD
**Background.** Studies in middle-age adults have established prediabetes and diabetes as major cardiovascular disease (CVD) risk factors. Whether these associations persist among older adults is less clear.

**Methods.** Older adults in the Atherosclerosis Risk in Communities (ARIC) Study who attended visit 5 (2013-2015; n = 5,791; ages 66-90) were followed for recurrent global CVD events (fatal or non-fatal myocardial infarction, stroke, and heart failure) and all-cause mortality. We used Cox proportional hazards and negative binomial regression to quantify and compare the independent associations of prediabetes (hemoglobin A1c [A1c]: 5.7-6.3%) and diabetes (prior diagnosis, medication use, or A1c ≥ 6.4%), traditional CVD factors, subclinical CVD (assessed using high sensitivity cardiac troponin [hs-cTnT]), and short-term risk of clinical outcomes in this older population.

**Results:** Over a median follow-up of 4.6 years, there were 5,442 global CVD events (32% with at least one event) and 660 deaths. Diabetes, but not prediabetes, was significantly associated with both outcomes (Table). After adjustment for traditional risk factors, diabetes of shorter duration was no longer significantly associated with global CVD; however, diabetes of longer duration, renal disease, and subclinical CVD remained significantly associated with both outcomes. Higher risks of global CVD events and mortality were observed in Blacks compared to Whites.

**Conclusions.** Prediabetes and short-term diabetes were not major independent predictors of short-term CVD events or death in older adults, especially compared to hypertension, kidney disease, long-term diabetes, and subclinical and prevalent CVD. Our results support focusing on these latter risk factors in older adults.


**Funding:** No

**Funding Component:**

**MP48**

**Control of Cardiovascular Risk Factors Among Older Adults With Incident Diabetes: The Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study**

Gargya Malla, Andrea Cherrington, Sha Zhu, Univ of Alabama at Birmingham, Birmingham, AL; Doyle M. Cummings, East Carolina Univ, Greenville, NC; Olivio Clay, Todd M. Brown, Loretta T Lee, Univ of Alabama at Birmingham, Birmingham, AL; Ruth Kimokoti, Simmons Coll, Boston, MA; Mary Cushman, Univ of Vermont Medical Ctr, Burlington, VT; Monika M. Safford, Weill Cornell Medical Coll, New York, NY; April P. Carson, Univ of Alabama at Birmingham, Birmingham, AL.

**Background:** Control of risk factors is important for the primary prevention of cardiovascular disease among adults with diabetes. The objective of this study was to determine whether management of clinical (hemoglobin A1c [A1c]: 5.7-6.3%), and diabetes (prior diagnosis, medication use, or A1c ≥ 6.4%) was independently associated with incident diabetes.
A1c <8%; BP <130/80 mm Hg; and statin use) and lifestyle factors (not currently smoking; physical activity on 4+ days/week; and moderate or no alcohol use) varied by race and sex among older adults with incident diabetes. **Methods:** This study included 1,420 Black and White adults from the REGARDS Study with incident diabetes at the follow-up exam (2014-16). Incident diabetes was defined as fasting glucose>=126 mg/dL, random glucose>=200 mg/dL, or use of diabetes medications among those without diabetes at baseline (2003-07). Modified Poisson regression was used to obtain prevalence ratios (PR) for the control of risk factors for Black versus White adults and assess race-sex interactions. **Results:** The mean age was 71.5 years, 53.6% were female, 46.1% were Black and 85.7% reported they were aware of their diabetes. BP control was lower for Black males than White males (p=0.0036), whereas statin use was lower for Black females than White females (p=0.0241). For lifestyle factors, not smoking was lower for Black males than White males (p=0.0187), whereas moderate or no alcohol use was higher for Black females than White females (p<0.0001). (Figure) Race-sex interactions were not statistically significant. In age and sex-adjusted models, Black adults were less likely to have BP controlled (PR=0.89; 95% CI=0.81, 0.99) or use statins (PR=0.88; 95% CI=0.80, 0.97) and more likely to report moderate or no alcohol use (PR=1.05; 95% CI=1.03, 1.07) than White adults. Control of other factors was similar. **Conclusion:** Although control of individual risk factors was generally high among older adults with incident diabetes, racial differences in BP control and statin use were apparent. Assessment and management of cardiovascular risk factors in this high-risk population remains important for prevention.

**Disclosures:** G. Malla: None. A. Cherrington: None. S. Zhu: None. D.M. Cummings: None. O. Clay: None. T.M. Brown: B. Research Grant; Modest; Omthera Pharmaceuticals, Amgen, Inc.. L.T. Lee: None. R. Kimokoti: None. M. Cushman: None. M.M. Safford: None. A.P. Carson: B. Research Grant; Significant; Amgen, Inc..

**Funding:** No

**Funding Component:**

**MP49**

**Influence of Social Determinants of Health on Emergency Department Visits Among Individuals With Coronary Heart Disease and Stroke: an Analysis of the 2010-2016 National Health Interview Surveys**

Diana Lyn Baptiste, Yvonne Commodore-Mensah, Ruth-Alma Turkson-Ocran, Cheryl R. Dennison Himmelfarb, Hae-Ra Han, Johns Hopkins Sch of Nursing, Baltimore, MD

**Introduction:** Coronary heart disease (CHD) and stroke are leading causes of morbidity and mortality in the U.S. Over 92 million Americans have been diagnosed with CHD/stroke and have more costly emergency department (ED) visits to manage acute and chronic symptoms. These visits are often attributed to poor access to primary care, advanced age, and poor social support. Social determinants of health (SDoH) have been suggested for a variety of health outcomes, yet their relation to healthcare...
utilization such as ED visits among individuals with CHD/stroke is unclear. **Hypothesis:** We hypothesized that SDoH would be associated with having ≥1 ED visit(s) in the prior 12 months among patients with CHD and stroke. **Methods:** A cross-sectional analysis of the 2010-2016 National Health Interview Survey was conducted among those who self-reported CHD/stroke diagnosis. Logistic regression analyses were performed with the outcome reporting ≥ 1 ED visit for any reason in the prior 12 months. SDoH examined were race, employment status, poverty, insurance status, and marital status. **Results:** We included 6,930 participants with diagnosis of CHD/stroke. The mean age (±sd) was 67.09 (±0.10) years. After adjusting for age, sex, perceived health status, Blacks (OR: 1.27, 95%CI: 1.14-1.41) and unmarried persons (OR: 1.21, 95% CI: 1.11-1.31) were more likely to report having at ≥ 1 ED visits than their White and married counterparts (Table). Compared to Whites, Asians (OR: 0.65, 95%CI: 0.51-0.81) had lower odds of having ≥ 1 ED visit. Those who were employed were less likely (OR: 0.75, 95%CI: 0.67-0.83) to have ED visits compared to those who were unemployed. Those who were not poor/near poor (OR: 0.86, 95%CI: 0.78-0.96) had lower odds of ED visits than the poor. **Conclusions:** Being Black, poor, unemployed and unmarried were associated with a higher odds of ED visits in the prior 12 months among those with CHD/stroke. Targeted and culturally-appropriate strategies that address SDoH among this vulnerable, high risk population may help prevent costly ED visits.

**Disclosures:** D. Baptiste: None. Y. Commodore-Mensah: None. R. Turkson-Ocran: None. C.R. Dennison Himmelfarb: None. H. Han: None.

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**Funding Component:**

**MP50**

**Regional Income and Relative Individual Income, but Not Income Inequality, is Associated With Cardiovascular Health**

**Sarah S Singh,** Stephanie J Frisbee, Univ of Western Ontario, London, ON, Canada

**Background:** Result from many studies support that the associations between income, income inequality, and mortality, including CVD mortality, are very complex. Given the urgent need for greater CVD prevention in populations, it is essential to understand how income inequality and income, both in individuals and the regions in which they live, can affect cardiovascular health (CVH). **Objective:** To examine the associations between regional income and income inequality and individual relative income and individual CVH. **Setting:** This study was carried out in a nationally representative sample of Canadian adults aged
20 years and older residing in 113 health regions (HR) across Canada. **Data and Methods:** This study is a cross-sectional design using data from the Canadian Community Health Survey (CCHS) 2015-2016 database. The CCHS is a nationwide, nationally representative survey that collects information on the health status, health care utilization, and health determinants of the Canadian population. The study outcome was individual CVH, defined using the AHA CVH Index (CVHI) and determined using self-reported responses in CCHS. Regional income inequality was measured as the Gini coefficient of the HR. Regional income was measured as the median household income in the HR. Individual income was measured as relative, not absolute, income representing the individual’s household income compared to those in the HR. Multilevel models were used to examine the associations between regional income and income inequality and individual relative income and individual CVH, controlling for individual age, sex, race and education. Analyses were conducted using SAS 9.4 software. **Results:** The majority of the population were males (51%), aged 40-60 (37%), with tertiary education (64%) and of the White race (79%). Overall, mean CVH for individuals was 4.5. The national average Gini coefficient across HRs was 0.4. The average individual fell within the 6th decile for relative household income. Living in a HR with greater income inequality was not associated with lower individual CVH (β= -0.04 p-value=0.91), though living in an HR with higher median household income was associated with better individual CVH (β= 0.32 p=0.004). Finally, having higher relative household income was associated with better individual CVH (β= 0.05 p<0.0001), regardless of the median income of the region of residence. **Conclusion:** While the inequality of income within a HR did not significantly affect CVH, higher regional income and relative individual income was associated with better CVH. Results of this study contribute to the growing body of evidence attempting to disentangle the true associations between income, income inequality, and CVH.

Disclosures: **S.S. Singh:** None. **S.J. Frisbee:** None.

**Funding:** No

**Funding Component:**

**MP51**

**Sleep Characteristics and Adverse Social Exposures Elevate Blood Pressure in Young Black Females**

**Jewel Scott,** Susan Silva, Leigh Ann Simmons, Duke Univ Sch of Nursing, Durham, NC

**Introduction:** The prevalence of hypertension (HTN) in Black females is 46%, which is higher than males and other females in the United States. Among Black females, HTN develops at younger ages and often is more difficult to treat. Research suggests that sleep quality and quantity may have sex- and race-specific implications for CV health. Further, sleep characteristics may be a behavioral response to adverse social exposures (e.g., discrimination, financial stress), and this response may be amplified among young adults.

**Hypothesis:** We assessed the hypothesis that sleep characteristics and adverse social exposures may contribute to elevated blood pressure in Black women.

**Methods:** Participants included 634 Black females who participated in the National Longitudinal Study of Adolescent to Adult Health (Add Health), a nationally representative study of youth in the U.S. initially enrolled between 7th-12th grades and followed over 2.5 decades. Adverse social exposures included child abuse, discrimination, perceived stress, social isolation, and subjective social status. Self-reported sleep characteristics included measures of duration, latency, continuity, and snoring. Applying 2018 AHA guidelines, participants were classified as having elevated BP (>120/80) or not in early adulthood (age 24-32 years). Bivariate and multivariable logistic regression was used to evaluate the influence
of social exposures, sleep characteristics, and their interactions on elevated BP.

**Results:** Despite a mean age of 28.9 years, 58% (374 of 634) of the sample had elevated BP. In bivariate analyses, lack of sleep continuity, snoring, less social isolation, and less perceived stress predicted elevated BP, but sleep duration and latency did not. Multivariable analyses that adjusted for demographics, BMI, and depression indicated that elevated BP was associated with snoring (OR 1.458, p=0.03), frequent awakening (OR 1.904, p=0.0005), less social isolation (OR 0.691, p=0.05), and lower perceived stress (OR 0.646, p=0.02). Interactions between sleep characteristics and social exposures were insignificant in predicting elevated BP.

**Conclusions:** Sleep characteristics may represent a key risk factor for HTN that could be addressed in targeted interventions beginning in adolescence. Given the unexpected inverse relationship between social isolation, perceived stress, and elevated BP, future research should examine how current paradigms and measures of social connectedness and stress may need to be adapted to better elucidate the impact of these factors on Black women’s long-term CV health.

Disclosures:  J. Scott: None. S. Silva: None. L. Simmons: None.

Funding: No

Funding Component:

**MP52**

**Racial Disparity in Habitual Sleep Pattern Among Adolescents is Modified by Caloric Intake**

Fan He, Huamei Dong, Julio Fernandez-Mendoza, Edward O. Bixler, Jiangang Liao, Alexandros N. Vgontzas, Duanping Liao, Penn State Coll of Med, Hershey, PA

**Introduction:** Racial-ethnic minorities have been reported to sleep shorter and have worse sleep quality compared to non-Hispanic whites. Furthermore, nutrition intake has been associated with markers of inadequate habitual sleep. However, the role of nutrition intake on the racial disparity in habitual sleep has been rarely investigated, especially among adolescents.

**Hypothesis:** We hypothesize that nutrition intake modifies the association between race/ethnicity and habitual sleep pattern in adolescents.

**Methods:** We analyzed the data obtained from 421 adolescents who completed the follow-up examination of the Penn State Child Cohort (PSCC) study. We collected actigraphy-measured sleep durations on 7 consecutive nights and computed the intra-individual mean and standard deviation (SD), as measures of habitual sleep duration (HSD) and habitual sleep variability (HSV), respectively. We also measured participants’ daily macro-nutrients intakes, including total calorie, total fat, carbohydrates, and protein, through the Youth/Adolescent Food Frequency Questionnaire. Adjusted mean HSD and HSV among non-Hispanic whites and minorities were computed and compared by using analysis of covariance (ANCOVA), while controlling for age, sex, BMI percentile, total caloric intake, and socioeconomic status. The significance of an interaction between race/ethnicity and nutrition intake was further tested in ANCOVA models to assess the effect modification of nutrition intake on the racial differences in habitual sleep.

**Results:** The mean (SD) age of the study population was 16.7 (2.3) years. The study population consisted of 79.3% non-Hispanic White, 13.0% African American, 4.6% Hispanics, 2.2% Asian, and 0.9% American Indian. After controlling for major covariates, adolescents who were self-identified as racial-ethnic minorities showed significantly shorter HSD ($\beta(\text{SE})$: 15.9 (6.7) minutes/night, $p=0.02$) and higher HSV ($\beta(\text{SE})$: 9.7 (4.8) minutes/night, $p=0.04$) compared to non-Hispanic whites.
More importantly, nutrient intakes played a significant effect modification role in the racial-ethnic difference in HSV. Specifically, racial difference in HSV was significantly more pronounced among adolescents with higher caloric intake, especially from carbohydrates (p for interaction < 0.05).

**Conclusion:** Adolescents belong to racial-ethnic minorities sleep objectively shorter and with greater night-to-night variability than non-Hispanic whites. The racial-ethnic difference in habitual sleep variability is more pronounced among adolescents with high caloric intake, particularly from carbohydrates. If confirmed, these data may suggest that the inter-relationship among habitual sleep duration, sleep variability, and caloric intake may contribute to the disproportionate cardiovascular disease risks among racial-ethnic minorities.


**Funding:** No

**Funding Component:**

**MP53**

**Caregiving, Stress, and Depression Are Associated with Lower Achievement of Cardiovascular Health Metrics Among Women: The AHA’s Life’s Simple 7 and the Go Red for Women Strategically Focused Research Network**

**Brooke Aggarwal**, Nour Makarem, Stephanie Byun, Zara Mayat, Ming Liao, Heidi Mochari Greenberger, Columbia Univ Medical Ctr, New York, NY

**BACKGROUND:** Women constitute the overwhelming majority of caregivers in the US, whether taking care of children, ill spouses, or others. Caregiving has been identified as an independent risk factor for CVD mortality, yet few data have evaluated caregiving and other coexisting psychosocial risk factors (e.g., stress, depression) with cardiovascular health (CVH) according to the AHA’s Life’s Simple 7 (LS7).

**HYPOTHESIS:** Caregiving, stress, and depression will be associated with meeting overall and individual metrics of CVH included in the AHA LS7 (smoking, diet, physical activity, body mass index (BMI), blood pressure (BP), total cholesterol, and fasting glucose), among a diverse population of women across the life span.

**METHODS:** English/Spanish-speaking women aged 20-76 y, participating in the AHA Go Red for Women SFRN observational cohort study, were included (N=506, 61% racial/ethnic minority, mean age = 37 ±16y). Caregiver strain was assessed using the Caregiver Strain Index; psychological stress using the Perceived Stress Scale, and depressive symptoms using the Beck Depression Inventory-II. LS7 score was calculated using established methodology: metrics were scored as 0 (poor), 1 (moderate), and 2 (ideal), and then summed to create a total LS7 score such that higher scores reflected better CVH (0-8: poor, 9-11: moderate, 12-14: ideal). Linear regression models were used to evaluate cross-sectional associations between 1) caregiver strain, 2) psychological stress, and 3) depression, and the LS7 overall score and its components adjusted for age, race, ethnicity, education, and health insurance status.

**RESULTS:** More than one in five women in the sample reported significant caregiving responsibilities (all/most/some of the time); 29% of those had high levels of caregiver strain. Twenty-two percent had high levels of stress and 18% had depressive symptoms. Mean LS7 score was 9.68 ±2.2, and 27%, 33%, and 40% of women had poor, moderate, and ideal total scores, respectively. After adjustment for confounders, higher caregiver strain was associated with poorer LS7 score (β=-.08, p=.03), poorer diet score (β=-.02, p=.01) and poorer BMI score (β=-.04, p=.003). Greater caregiving responsibilities were associated with poorer BMI score (β=-.06,
Higher perceived stress was associated with poorer LS7 score (β = -0.11, p = 0.008), and poorer diet score (β = -0.02, p = 0.01). Having greater depressive symptoms was associated with poorer LS7 score (β = -0.04, p = 0.001).

**CONCLUSIONS:** Among a diverse cohort of women, psychosocial factors including caregiving, stress, and depression were associated with worse overall CVH and lower likelihood of meeting the LS7 metrics for healthy diet and BMI. Future research should determine if efforts to improve CVH among women are significantly enhanced by addressing dimensions of psychosocial health such as caregiver strain, stress, and depression.

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Funding Component: National Center

**MP54**

**Sex-Related Differences in the Association of Social Isolation With Plasma Leptin Concentration**

**Todd R. Sponholtz,** Ramachandran S. Vasan, Boston Univ Sch of Med, Boston, MA

Introduction: Studies have reported a positive associations of depression and psychosocial stress and plasma leptin concentration. Social isolation has been linked to increased leptin signaling in male rats, but this association has not been investigated in humans.

Methods. We investigated the cross-sectional association of social isolation and plasma leptin concentration among 2,729 Framingham Offspring Cohort participants at the 7th examination (1999-2001, mean age = 60.1 years, 42% men). Social isolation was measured using the Berkman-Syme Social Network Index: we assigned 1 point for being married, 1 point each for >2 close friends and >2 close relatives, 1 point for participation in social groups, and 1 point for participation in religious meetings ≥1-2 times per month. Social isolation was defined as a total of 0 points. Non-fasting plasma leptin levels were measured using a commercial immunoassay. The primary outcome was plasma leptin concentration. Secondary outcomes included caloric intake, measured by food frequency questionnaire, and volumes of abdominal subcutaneous adipose tissue (SAT), and visceral adipose tissue (VAT), measured by CT among 1,210 of the subjects between 2002 and 2005. Leptin concentration and adipose tissue volume were log-transformed due to skewed distributions. We estimated the associations of social isolation with all outcomes using linear regression. Models included age, body mass index, years of education, smoking status, physical activity index, hypertension, high blood glucose, and CES-D score as covariates. Because leptin levels and responses to social stress may vary among men and women, analyses were stratified by sex.

Results: Socially isolated participants were younger and had higher CES-D scores than those who were not. Other characteristics were similar between the two groups. Plasma leptin concentration was 20% lower among socially isolated men (95% CI: -31, -6%) compared with men who were not isolated. Social isolation was also associated with lower caloric intake as well (β = -144.5 kcal, 95% CI: -287.1, -1.87 kcal). Among the subset of men for whom we had adipose tissue depot volume measurements (n=552), VAT volume appeared to be 10% lower among socially isolated men compared with non-isolated men (95% CI: -19, 1%), but this was not true of SAT (β = 1%, 95% CI: -9, 10%). We did not observe differences in leptin concentration (β = -1%, 95% CI: -10, 15%), caloric intake (β = -39.1 kcal, 95% CI: -136.0, 57.7 kcal) or SAT (β = 4%, 95% CI: -3, 14%) according to social isolation among women. Socially isolated women appeared to have higher VAT (β = 10, 95% CI: -1, 10%)

Conclusions: In our population of middle-aged and older adults, social isolation was associated
with lower leptin levels among men, but not women. The lower leptin concentration observed among isolated men may reflect decreased caloric intake in response to social stress.

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Funding Component:

MP55

Racial Differences in Metabolomic Profiles Between African Americans and Whites in the Women’s Health Initiative

Jie Hu, Brigham and Women’s Hosp, Boston, MA; Raji Balasubramanian, Univ of Massachusetts Amherst, Amherst, MA; Jun Li, Harvard T.H. Chan Sch of Public Health, Boston, MA; Clary B. Clish, Broad Inst of MIT and Harvard, Cambridge, MA; Nina P. Paynter, Christine M. Albert, Brigham and Women’s Hosp, Boston, MA; Simin Liu, Brown Univ Sch of Public Health, Providence, RI; Milagros C. Rosal, Univ of Massachusetts Medical Sch, Worcester, MA; Rami Nassir, Univ of California, Davis, CA; Kathryn M. Rexrode, Brigham and Women’s Hosp, Boston, MA

Introduction In the US, African Americans (AA) have higher cardiovascular disease (CVD) morbidity and mortality than whites. Recent evidence suggests that the CVD development may be related to circulating metabolite alterations, which might contribute to racial disparities in CVD risk.

Hypothesis We tested the hypothesis that metabolomic profile of AAs differ from that of whites.

Methods Metabolomic profiling in plasma samples of 2,128 women from the Women’s Health Initiative (WHI) was performed using liquid chromatography-tandem mass spectrometry, and 422 known metabolites were measured. The discovery set included 834 women (138 AAs) from the WHI Observational Study. The replication set included 1,294 women (156 AAs) from the WHI Hormone Therapy Trials. Linear regression models were applied to individually estimate the association of race (AA vs. white) with each metabolite, adjusting for age, body mass index, education, income, healthy eating index-2005, physical activity, smoking, alcohol intake, hypertension, diabetes, depression, and medications. Metabolites with a false discovery rate-adjusted \( P < 0.05 \) in the discovery set were then replicated in the replication set with a Bonferroni corrected \( P < 0.05 \) indicating statistical significance.

Results We identified 178 metabolites that significantly differed between AAs and whites in both discovery and replication sets, the majority of which were lipids, followed by amino acids and their derivatives (Panel A). For the 178 metabolites, the mean levels of 126 metabolites differed between AAs and Whites by at least 0.5 standard deviation units; 9 of these metabolites (1 triacylglycerol, 3 phosphatidylcholines, 2 phosphatidylethanolamine plasmalogens, and 3 cholesteryl esters) had mean differences exceeding 1-standard deviation unit (Panel B).

Conclusions Metabolomic profiles significantly differed between AAs and whites, especially lipid metabolites, and these race-associated alterations may contribute to racial disparities in cardiovascular risk.

Funding:  No

Funding Component:

MP56

Length of Stay and Allostatic Load in Immigrants to the United States-Evidence From the 2011 - 2016 National Health and Nutrition Examination Surveys

Ruth-Alma N. Turkson-Ocran, Johns Hopkins Univ, Baltimore, MD; Nwakeugo A Nmezi, Univ of Florida, Gainsville, FL; Nancy Perrin, Yvonne Y Commodore-Mensah, Sarah L Szanton, Johns Hopkins Univ, Baltimore, MD

Introduction:  Stress alters the cardiometabolic and inflammatory systems.  Allostatic load, a measure of chronic and cumulative stress is associated with cardiovascular events and mortality.  Immigration is known to be a stressful experience; however, it is unclear how length of stay, a proxy for acculturation, is associated with allostatic load in US immigrants.

Hypothesis:  We hypothesized that greater length of stay will be associated with higher allostatic load among US immigrants.

Methods:  We used a cross-sectional design to examine the 2011-2016 National Health and Nutrition Examination Surveys.  Allostatic load was defined by a count of the number of high-risk classifications for 10 cardiovascular, metabolic, and immune system biomarkers: systolic blood pressure, diastolic blood pressure, total cholesterol, triglycerides, glycated hemoglobin, albumin, creatinine clearance, body mass index, waist circumference, and white blood cells.  Logistic regression was used to examine the odds of a high allostatic load score (≥ 4) as in previous literature, adjusting for survey weights.

Results:  We included 7318 immigrants with mean age (±se) 44(±0.52); 49% were male.  Half of the sample was of Mexican/Hispanic origin, 26% were Asian and 7% were Black.  The median allostatic load score was 2.2.  The odds of high allostatic load decreased with longer stay in the US.  After adjusting for age, race, education, income, insurance status, and routine place for healthcare, those who had resided in the US for 10 to 20 years were 45% (95% CI: 1.1-1.9) more likely to have a high allostatic load than those who had been in the US <10 years.  The unadjusted and adjusted results are presented in the Table.

Conclusion:  Length of stay in immigrants is associated with having a high allostatic load.  The odds of increased allostatic load declines with longer length of US residence.  Additional research is needed to further understand the process and impact of cumulative stress among immigrants to reduce racial/ethnic health disparities.

Funding: No

Funding Component:

MP57

Genetics of Chronic Kidney Disease Stages Across Ancestries: The PAGE Study

Nora Franceschini, Bridget M Lin, Univ of North Carolina, Chapel Hill, NC

Background. Chronic kidney disease (CKD) is common, disproportionately burdens ethnic minorities in the US, and is associated with increased cardiovascular mortality. Our prior trans-ethnic genetic research has identified approximately 100 loci for kidney function. We now extend this research to CKD stages in studies of diverse populations. To uncover genetic factors associated CKD stages, we performed genome-wide association studies in diverse populations within the Population Architecture using Genomics and Epidemiology (PAGE) study. Methods. We assembled multi-ethnic data on CKD non-overlapping cases (4,690 mild to moderate CKD, 1,105 advanced CKD [stage 5] including end-stage kidney disease) and non-CKD controls for up to 46,263 PAGE participants (African Americans, Hispanics/Latinos, East Asian, Native Hawaiian and American Indians). We implemented a generalized estimating equation approach for single test genome-wide association analyses using ancestry combined data and adjusting for age, sex, principal components, study and ethnicity. Results. The analyses identified two associated loci at p < 5.3 x 10^{-8}, including a novel association with mild to moderate CKD on chromosome 9, which is driven by an intronic variant of TYRP1 (rs18620870, allele frequency 0.01 in our combined sample, 1000 Genomes: 0.02 in AFR, 0.003 AMR, 0.001 EUR, p=4.4 x 10^{-8}). Several genome-wide associated variants at the APOL1 locus were associated with advanced CKD. The most significant finding was for APOL1 G1 rs73885319 (p=1.19 x 10^{-9}). Additional variants with suggestive associations at p<10^{-6} for advanced CKD included an intronic low frequency variant in FTO (rs7189997) and a variant nearby IRX3 (rs8050506). Both variants are more common in African ancestry and these loci were previously associated with obesity traits. Conclusions. Our study on the genetics of CKD identified a novel locus for mild to moderate CKD and showed for the first time strong associations of African-ancestry APOL1 variants with advanced CKD across multi-ethnic populations.

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MP58

Intermuscular Fat Density: Novel Risk Factor for Cardiometabolic Risk Factors in African-Ancestry Men

Curtis Tilves, Allison L Kuipers, Joseph M Zmuda, Univ of Pittsburgh Graduate Sch of Public Health, Pittsburgh, PA; J Jeffrey Carr, James G Terry, Sangeeta Nair, Dept of
Radiology, Vanderbilt Univ Medical Ctr, Nashville, TN; Akira Sekikawa, Clareann H Bunker, Univ of Pittsburgh Graduate Sch of Public Health, Pittsburgh, PA; Victor Wheeler, Tobago Health Studies Office, Scarborough, Trinidad and Tobago; Iva Miljkovic, Univ of Pittsburgh Graduate Sch of Public Health, Pittsburgh, PA

**Background:** While overall obesity remains a major risk factor for cardiometabolic diseases, the location of stored fat is also thought to play a role. In addition to fat storage in ectopic sites, the density of fat, a marker of fat quality, is emerging as a novel risk factor for cardiometabolic diseases. Previous studies have focused primarily on visceral (VAT) and abdominal subcutaneous (SAT) adipose tissue density and in predominantly white cohorts; however, studies in populations of African ancestry who are at higher risk of cardiometabolic diseases are lacking. Additionally, information is lacking on associations of density of other relevant ectopic fat depots, such as intermuscular adipose tissue (IMAT), with cardiometabolic risk factors.

**Methods:** We investigated whether VAT, SAT, or thigh IMAT densities were associated with cardiometabolic measures in 648 black men aged 50-91 years (mean age 63.6 years, mean BMI 27.7 kg/m²). Adipose tissue volume (cm³) and density (Hounsfield units, HU) was measured in the abdomen (between L4 and L5) and mid-thigh from computed tomography scans. Cardiometabolic measures, including blood pressure, fasting serum glucose and insulin homeostasis, and serum lipids (N=476), were transformed as needed and used as outcomes in multiple linear regression models adjusting for age, lifestyle factors, medication use (antihypertensive, antidiabetic, or lipid-lowering), and corresponding fat depot volume. Relevant medications.

**Conclusion:** As reported in other studies, in our study among African ancestry individuals VAT and SAT were associated with several cardiometabolic risk factors. Importantly, our findings suggest that thigh IMAT density may be a novel predictor of cardiometabolic risk in African ancestry men.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>VAT HU β</th>
<th>P-value</th>
<th>SAT HU β</th>
<th>P-value</th>
<th>IMAT HU β</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic Blood Pressure (mmHg)</td>
<td>-0.01</td>
<td>0.0230</td>
<td>-0.18</td>
<td>0.1210</td>
<td>-0.32</td>
<td>0.0950</td>
</tr>
<tr>
<td>Diastolic Blood Pressure (mmHg)</td>
<td>-0.11</td>
<td>0.2048</td>
<td>-0.06</td>
<td>0.1926</td>
<td>-0.08</td>
<td>0.4358</td>
</tr>
<tr>
<td>Fasting Glucose (mg/dL)</td>
<td>-0.20</td>
<td>0.1710</td>
<td>-0.01</td>
<td>0.2055</td>
<td>-0.17</td>
<td>0.3457</td>
</tr>
<tr>
<td>Fasting Insulin (μU/mL)</td>
<td>-0.21</td>
<td>0.0001</td>
<td>-0.05</td>
<td>0.0001</td>
<td>-0.23</td>
<td>0.0001</td>
</tr>
<tr>
<td>HOMA-IR</td>
<td>-0.05</td>
<td>0.0001</td>
<td>-0.05</td>
<td>0.0001</td>
<td>-0.06</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>HDL-c (mg/dL)</td>
<td>-0.08</td>
<td>0.0149</td>
<td>-0.15</td>
<td>0.0250</td>
<td>-0.03</td>
<td>0.1000</td>
</tr>
<tr>
<td>LDL-c (mg/dL)</td>
<td>-1.15</td>
<td>0.0001</td>
<td>-1.09</td>
<td>&lt;0.0001</td>
<td>-1.70</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Triglyceride (mg/dl)</td>
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<td>0.0002</td>
<td>-0.82</td>
<td>0.0002</td>
<td>-0.64</td>
<td>0.1050</td>
</tr>
</tbody>
</table>

Adjusted for age, smoking, alcohol use, physical activity, sedentary lifestyle, medication use, and corresponding fat depot volume.


**Funding:** No

**Funding Component:**

**MP59**

The Differential Effects of Amount and Intensity of Aerobic Exercise Training on MVX, a Novel Mortality Risk Multimarker

Leanna M Ross, Cris A Slentz, Duke Univ Medical Ctr, Durham, NC; Irina Shalaurova, Margery A Connelly, James D Otvos, Lab Corp of America Holdings (LabCorp), Morrisville, NC; Joseph A Houmard, East Carolina Univ, Greenville, NC; William E Kraus, Duke Univ Medical Ctr, Durham, NC

**Introduction** Metabolic Vulnerability Index (MVX) is a novel spectroscopic multimarker of mortality risk. MVX reflects components of nutrition and systemic inflammation status and is hypothesized to enhance disease and mortality risk stratification. As Studies Targeting Risk Reduction Interventions through Defined Exercise (STRRIDE) has previously demonstrated relevant medications.
the ability of aerobic exercise training to improve traditional markers of cardiometabolic health, we hypothesized that aerobic exercise intervention also would result in beneficial changes in the components of MVX.

**Methods** Participants (n=222, previously sedentary, overweight men and women with mild to moderate dyslipidemia from STRRIDE) were randomized to either a 6-month control group or to one of three supervised aerobic exercise groups for 8-months: 1) low amount moderate intensity (LM): 14 kcal/kg/wk at 40-55% VO2peak; 2) low amount vigorous intensity (LV): 14 kcal/kg/wk at 65-80% VO2peak; 3) high amount vigorous intensity (HV): 21 kcal/kg/wk at 65-80% VO2peak. Blood samples were obtained after an overnight fast at both baseline and study completion (16-24 hr after the final training bout for exercisers). Nuclear magnetic resonance spectroscopy was performed on the Vantera® clinical analyzer at LabCorp to determine MVX score. MVX has two components: inflammation index [INFX; combined concentrations of GlycA and small HDL particle subspecies (diameters < 9 nm)] and metabolic malnutrition index (MALNX; combined concentrations of total branched chain amino acids and ketone bodies). MVX, INFX, and MALNX are all scaled from 1 (lowest risk) to 100 (highest risk). Paired t-tests determined whether the post- minus pre-intervention change scores within each group were significant (p<0.05). We used analysis of covariance accounting for baseline values to determine difference between groups.

**Results** The inactive control group did not exhibit significant changes in any of the multimarkers. After 8-months of exercise training, the LM group experienced significant decreases in all three scores: INFX (-2.1 ± 5.2), MALNX (-3.1 ± 11.3), and MVX (-3.9 ± 9.1). The LV group significantly decreased their INFX score (-1.5 ± 3.8), yet significantly increased MALNX (2.2 ± 6.8). The HV group significantly decreased their INFX (-1.6 ± 4.8) and MVX scores (-1.9 ± 5.6). For the LM group, the beneficial changes in MALNX and MVX were significantly greater than the LV group.

**Conclusion** Aerobic exercise improved components of the novel risk-prediction multimarker MVX, with the LM group displaying the best responses across all three scores. Ongoing research investigates the clinical utility of these multimarkers, this study provides evidence for the ability of exercise intervention to beneficially change MVX score.


Funding: No

Funding Component: MP60

**Changes in Gut Microbiota Metabolite TMAO Are Related to Changes in Hepatic and Visceral Fat in Weight-loss Diet Interventions: the POUNDS Lost Trial**

Xiang Li, Dianjianyi Sun, Tao Zhou, Yoriko Heianza, Tulane Univ, New Orleans, LA; George Bray, Pennington Biomedical Res Ctr, Louisiana State Univ, Baton Rouge, LA; Frank Sacks, Dept of Nutrition, Harvard T.H. Chan Sch of Public Health, Boston, MA; Lu Qi, Tulane Univ, New Orleans, LA

**OBJECTIVE:** Gut microbiota metabolite Trimethylamine-N-oxide (TMAO) has been related to obesity and various cardiometabolic disorders. TMAO is involved in lipid metabolism in the liver; however, little is known about whether changes in TMAO affect hepatic fat and abdominal fat distribution, and whether genetic variations modify such effects.

**RESEARCH DESIGN AND METHODS:** The present study included 92 overweight and obese participants from the POUNDS Lost trial having complete data on computed tomography (CT) scans and a genetic risk score (GRS) for nonalcoholic fatty liver disease (NAFLD). We analyzed the associations of
changes in plasma TMAO with changes in hepatic fat and fat distribution from baseline to 6 months; we also assessed the interactions between the GRS and changes in TMAO. 

**RESULTS:** Larger decreases in TMAO from baseline were significantly associated with a reduction in subcutaneous adipose tissue (SAT), visceral adipose tissue (VAT), and total adipose tissue (TAT) at 6 months, p=0.01, 0.02, and 0.003, respectively. In addition, we found that larger decreases in TMAO were associated with increases in HDL-cholesterol and decreases in triglycerides, p=0.02 and 0.03, respectively. Moreover, we observed significant interactions between 6-month changes in TMAO and the NAFLD GRS on the concurrent changes in liver fat (P interaction=0.007) and VAT (P interaction =0.018).

Among individuals whose TMAO decreased, a lower NAFLD GRS tends to predict a greater improvement in hepatic fat and a reduction in VAT; while in those whose TMAO increased, no differences in hepatic fat or VAT were observed across the tertiles of NAFLD GRS. 

**CONCLUSIONS:** Our data indicate that changes in TMAO are related to changes in hepatic and visceral fat in weight loss diet interventions; and such relations are modified by genetic variation. 

**TRIAL REGISTRATION:** ClinicalTrials.gov NCT00072995.

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**MP61**

**Preterm Delivery and Patterns of Cardiometabolic Risk Factors Pre- and Post-Childbearing: Coronary Artery Risk Development in Young Adults Study**

Baiyang Sun, Marnie Bertolet, Univ of Pittsburgh, Pittsburgh, PA; Cora E Lewis, Univ of Alabama at Birmingham, Birmingham, AL; Erica P Gunderson, Kaiser Permanente Northern California, Div of Res, Oakland, CA; Janet M Catov, Univ of Pittsburgh, Magee-Women’s Res Inst, Pittsburgh, PA

**Introduction:** Women with preterm delivery (PTD) have excess CVD risk and unfavorable risk factors before, during and after pregnancy, but few studies compare the pre- and post-childbearing eras. 

**Hypothesis:** Women with PTD have worse patterns of CVD risk factors both pre- and post-childbearing. 

**Methods:** CARDIA is a multi-center 30-year longitudinal (9 exams, 1985-2016) cohort of black and white adults initially aged 18-30. We included women with ≥1 post-baseline birth (n=1298) and categorized them according to PTD (any birth <37 wks.) or term births (all births ≥37 wks.). Annual changes in CVD risk factor (BMI, waist girth, lipids, and blood pressure [BP]) during pre-childbearing period (before the first post-baseline birth) and post-childbearing period (after the last post-baseline birth) were compared between PTD and term groups, using piecwise linear mixed-models which allowed differing intercepts and slopes for pre- and post-childbearing eras. Intercepts were set at the end of pre-childbearing and the start of post-childbearing; childbearing period, from the first to the last post-baseline birth, was collapsed. Models adjusted for socioeconomics, length of childbearing period, parity, time-varying lifestyle habits and medication use. 

**Results:** The annual BMI increase during the
pre-childbearing period did not differ by group, but the annual BMI increase after childbearing was larger in PTD group than term group (0.22 vs. 0.18 kg/m², p = 0.04; Table). The difference in diastolic BP from before to after childbearing period in PTD group was larger than term group (2.77 mmHg, p<0.01), with similar pre- and post-childbearing annual change in each group. No other risk factor differences were found.

Conclusions: PTD was not associated with pre-childbearing changes in CVD risk factors, but women with PTD exhibited accelerated gains of adiposity during the post-childbearing period, and worse diastolic BP pattern when completing childbearing. Further research is needed to assess the changes during childbearing period.

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MP62

Associations of Timing of Complementary Feeding Introduction and Adiposity Throughout Childhood and Adolescence

Veronique Gingras, Izzuddin M. Aris, Sheryl L. Rifas-Shiman, Karen M. Switkowski, Emily Oken, Marie-France Hivert, Harvard Medical Sch - HPHCI, Boston, MA

Introduction: Complementary feeding includes introducing food or beverages other than breastmilk or formula to infants. We previously showed associations of early complementary feeding (<4 months old) with higher obesity risk at 3 years old in formula-fed children only.

Hypothesis: We hypothesized that associations with adiposity would persist into early adolescence. Methods: Among 991 children from Project Viva, a pre-birth prospective cohort, we examined associations of complementary feeding timing with later body mass index (BMI) z-scores, waist circumference, and dual-energy radiograph absorptiometry (DXA) measured adiposity in mid-childhood (mean: 7.8, SD 0.8 years old; N=681) and in early adolescence (mean: 13.2, SD 0.9 years old; N=637). We used linear regression models adjusted for socio-demographic characteristics, parental BMI, and change in weight-for-age z-score from 0 to 4 months (as a marker of early infant growth); the reference group for all analyses was complementary feeding initiation between 4 to <6 months. We ran separate models for infants who were breastfed for ≥4 months (breastfed) and infants who were never breastfed or weaned <4 months of age (formula-fed). As a secondary analysis, we fitted individual BMI trajectories using mixed-effect models with natural cubic spline functions (N=952), and then examined the association of timing of complementary feeding with age at BMI rebound derived from the trajectories, using linear regression models, adjusting for previously listed covariates. Results: At 4 months of life, 66% (654 of 991) of children were breastfed and 34% (337 of 991) were formula-fed. Complementary feeding was introduced <4 months for 19% (188 of 991), between 4 to <6 months for 68% (674 of 991; reference group), and ≥6 months for 13% (129 of 991) of children. Complementary feeding <4 months was associated with higher waist circumference in both formula-fed (β 2.60, 95% CI [0.35, 4.86] cm) and breastfed children (1.98 [0.07, 3.89] cm) in mid-childhood, while in early adolescence, it was associated with higher BMI z-score (0.36 [0.04, 0.68]) in formula-fed children, and with higher waist circumference in both formula-fed (4.99 [1.14, 8.84] cm) and breastfed children (3.12 [0.02, 6.21] cm). Complementary feeding <4 months was additionally associated with an earlier age at BMI rebound (-7.6 [-12.6, -2.5] months) in breastfed children. Complementary feeding
initiated ≥6 months was associated with higher BMI z-score (0.50 [0.04, 0.97]) in mid-childhood and with an earlier age at BMI rebound (-11.5 [-20.0, -2.9] months) in formula-fed children only. **Conclusions:** We found associations of both early and late introduction of complementary feeding with BMI z-score in formula-fed infants and with waist circumference in breastfed and formula-fed infants throughout childhood.

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**MP63**

**How Much Does Exclusive Breastfeeding to the Recommended Six Months Increase Maternal Postpartum Weight Loss in Healthy Women?**

**Muna J. Tahir,** Jacob L. Haapala, Univ of Minnesota, Minneapolis, MN; Kara M. Whitaker, Univ of Iowa, Iowa City, IA; Laurie P. Foster, Univ of Minnesota, Minneapolis, MN; Katy M. Duncan, April M. Teague, Univ of Oklahoma Health Sciences Ctr, Oklahoma City, OK; Elyse O. Kharbanda, HealthPartners Inst, Minneapolis, MN; Patricia M. McGovern, Tonya C. Schoenfuss, Lisa Harnack, Univ of Minnesota, Minneapolis, MN; David A. Fields, Univ of Oklahoma Health Sciences Ctr, Oklahoma City, OK; David R. Jacobs, Jr., Ellen W. Demerath, Univ of Minnesota, Minneapolis, MN

**Objective:** Postpartum weight retention increases the risk of future obesity and cardiovascular disease. Although exclusive breastfeeding (EBF) has been promoted as an effective means to lose gestational weight gain, previous studies report mixed findings for the relationship between duration of EBF and maternal postpartum weight loss (PPWL). This study evaluates whether meeting the recommended 6-months of EBF is associated with greater PPWL by 6-months than a shorter duration of EBF.

**Methods:** The Mothers and Infants LinKed for Health (MILK) study is an ongoing prospective cohort of non-diabetic, non-smoking mother-infant dyads, all of whom were exclusively breastfeeding at 1-month postpartum. Breastfeeding exclusivity was subsequently self-reported by mothers at 3 and 6-months postpartum. Maternal pre-pregnancy weight and weight at delivery were abstracted from medical records. PPWL was calculated as maternal weight measured at 1, 3 and 6-months minus maternal weight at delivery. Mixed effects linear regression models were used to test the association of duration of EBF with repeated measures of PPWL after adjustment for covariates including maternal pre-pregnancy weight, gestational weight gain, parity, physical activity and infant sex.

**Results:** Among 315 mothers who were exclusively breastfeeding at 1-month, 93% and 75% continued EBF to 3 and 6-months, respectively. By 6-months postpartum, weight loss (least square means ± standard error) was 8.55 ± 1.31 kg among EBF to 1-month, -10.60 ± 0.82 kg among EBF to 3-months and -11.73 ± 0.37 kg among EBF to 6-months (Figure). EBF to 6-months was associated with greater PPWL by 6-months postpartum than EBF to 1 or 3-months (p<0.05) after covariate adjustment.

**Conclusion:** EBF to 6-months postpartum was associated with greater maternal PPWL than shorter EBF durations. Interventions may promote prolonged EBF as a means of increasing maternal weight loss by 6-months postpartum, but additional research is needed to explore whether these differences persist after weaning.

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Funding Component: MP64

The Role of Aspirin in the Relationship Between Hypertensive Disorders of Pregnancy and Incident Maternal Cardiovascular Disease


Introduction: Hypertensive disorders of pregnancy (HDP; including gestational hypertension and preeclampsia) are associated with an increased risk of maternal cardiovascular disease (CVD). Low-dose aspirin reduces the risk of preterm preeclampsia, through proposed short-term effects on platelet and endothelial function. While low-dose aspirin is recommended for prevention of preeclampsia in women at high risk, no recommendations exist for aspirin use following a pregnancy complicated by HDP. Hypothesis: We hypothesized that regular aspirin use after pregnancy would modify the association between HDP and CVD, lowering the magnitude of the association among aspirin users relative to non-users. Methods: Parous women free of CVD before first birth in the Nurses’ Health Study II comprised the analytic sample (n=60,392). Lifetime pregnancy history was reported in 2009. Women were followed for confirmed incident CVD (coronary heart disease [non-fatal or fatal MI, fatal CHD] or stroke [non-fatal or fatal]) from 1989 through 2013. Current regular aspirin use was self-reported at baseline in 1989 and updated every 2 years via biennial questionnaire. We used Cox proportional hazards models to estimate hazard ratios (HR) and 95% confidence intervals (CI) for the relationship between HDP in first pregnancy (using 3 mutually exclusive categories: normotension [ref], gestational hypertension, preeclampsia) and CVD, adjusted for age, race/ethnicity, parental education, family history of CVD <60y, and pre-pregnancy risk factors (smoking, physical activity, diet, alcohol intake, oral contraceptive use, BMI). Effect modification by aspirin was tested through a likelihood ratio test, comparing nested models with and without interaction terms between HDP history and time-varying aspirin use.

Results: Nine percent of women (n=5,629) had HDP in first pregnancy. CVD events occurred in 657 women with normotension, 30 women with gestational hypertension, and 75 women with preeclampsia. Compared to women with normotension in first pregnancy, gestational hypertension was associated with stroke (HR=1.65; CI: 1.01-2.71) but not CHD (HR=1.21; CI: 0.70-2.12), while preeclampsia was associated with CHD (HR=2.27; CI: 1.69-3.04) but not stroke (HR=1.03; CI: 0.68-1.57). Current aspirin use was not a significant effect modifier of the relationship between HDP and CVD (p-value=0.53). Hazard ratios for the relationship between gestational hypertension and CVD were 1.58 (CI: 1.01-2.49) among aspirin non-users and 1.15 (CI: 0.61-2.18) among aspirin users. Hazard ratios for the relationship between preeclampsia and CVD were 1.52 (CI: 1.10-2.10) among aspirin non-users and 1.67...
(CI: 1.16-2.40) among aspirin users. **Conclusion:** Aspirin use after pregnancy does not appear to modify the increased risk of CVD observed among women with a history of HDP compared to women with normotension in pregnancy.

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**MP65**

**Maternal Vascular Lesions in the Placenta May Identify Women Susceptible to Masked Hypertension a Decade After Pregnancy**

**Janet M Catov,** Univ of Pittsburgh Sch of Med, Pittsburgh, PA; Vanessa Assibey-Mensah, Magee-Womens Res Inst, Pittsburgh, PA; Matthew Muldoon, Univ of Pittsburgh Sch of Med, Pittsburgh, PA; Baiyang Sun, Univ of Pittsburgh, Pittsburgh, PA; W. Tony Parks, Univ of Toronto, Toronto, ON, Canada

Introduction: Women with placentally mediated pregnancy complications such as preeclampsia have excess hypertension and cardiovascular disease later in life, but the underlying pathophysiology linking these conditions is unknown. Hypothesis: We considered that histological examination of the placenta may reveal maternal vascular impairments that identify a group susceptible to blood pressure (BP) elevations a decade after delivery, including elevations that may only be detectable using out of office BP measurement. Method: Women with a singleton live birth at Magee-Womens Hospital (Pittsburgh, PA) during 2008-2009 were enrolled 8-10 years after delivery (n=248). Pregnancy features and placental pathology were abstracted from medical records. Women with placental vasculopathy (several related lesions arising from impaired remodeling of maternal myometrial and decidual arteries, n=24) or infarcts (n=32) were compared to women with neither lesion (n=192). Clinic BP was measured three times by trained research staff using a standard protocol and a validated home BP device. Women were trained to measure their BP twice daily for 7 days using the same device mentioned above. Subsequently, time and date stamped BP measures were downloaded (mean 12.2 measures ± 4.5). BP status (elevated, stage 1, stage 2) was identified using the 2018 ACC/AHA guidelines for clinic and home BP measures. Sustained normotensive, white coat, masked, and sustained hypertension status were classified. Results: Women were, on average, 37 years of age at measurement. In analysis controlled for age and race (p-value < 0.05) those with placental vasculopathy had higher mean diastolic BP in clinic and at home (80.5 ± 13.3 mmHg, 79.9 ± 10.4, respectively) than women without vascular lesions in the placenta (75.4 ± 9.8 mmHg and 74.3 ±8.6, respectively). In addition, women with placental vasculopathy had a higher prevalence of masked hypertension (higher elevated BP status measured at home vs. in clinic; 37.5% vs. 14.1%) that persisted after accounting for maternal age and race (adjusted OR 4.7, 95% confidence interval 1.6, 13.8). Vasculopathy associations were similar after excluding women with preeclampsia (n=42), the pregnancy complication most strongly associated with placental vascular pathology. There were modest, non-significant associations between placental infarcts and all measures of maternal blood pressure. Conclusions: Irrespective of prior preeclampsia, women with placental evidence of vasculopathy have excess hypertension and particularly masked hypertension in the decade after pregnancy. Our results emphasize the value of out of office blood pressure measurement, and indicate that placental vasculopathy may be pathophysiologically related to development of hypertension before age 50.
Background: Understanding body mass index (BMI) trajectories across the lifecourse may help identify risk of overweight or obesity and strategic points for preventive interventions. We describe BMI trajectories from childhood to adulthood in four population-based cohorts established in the 1970s-80s and their sociodemographic correlates.

Methods: Data were from 12,086 participants (45% male) from four cohorts established in Australia, Finland and the US. Participants had ≥3 measures of height and weight, including ≥1 in childhood (6-18 years, mean 9.7 to 11.1 years at first visit) and ≥1 in adulthood (mean 40.0 to 50.9 years at last visit). Latent Class Growth Mixture Modelling estimated BMI trajectory groups. Correlates (age, gender, race, parental education) of BMI trajectories were identified with log multinomial regression.

Results: Mean BMI ranged from 17.8-18.3 kg/m² at first visit and 26.4-30.2 kg/m² at last visit. Six BMI trajectories (Figure) were identified in three cohorts: persistently normal (48-57% of participants), improving from high (1-2%), progressing to overweight (30-39%), progressing to obese (1-8%), late onset obese (2-6%), and progressing to severe obesity (1-3%). One cohort had a seventh group: greatly improving (<1%). Women were less likely to progress to overweight and more likely to progress to obese than men. Black participants were at greater risk of progressing to obesity, severe obesity and late onset obesity than white participants. Improving from high BMI was associated with being younger at first visit and lower parental education.

Conclusion: Similar BMI trajectories were identified across cohorts, countries and time, despite different BMI distributions. Females and black Americans were most likely to be of high BMI at the end of follow-up. Few participants (<2%) improved from high BMI. A better understanding of the factors that influence the highest and improving BMI trajectories may help identify risk reduction strategies.
Reduction in Calories Purchased by Employees Two Years After Implementation of Cafeteria Traffic-light Labels and Choice Architecture

Anne N Thorndike, Emily D. Gelsomin, Douglas E. Levy, Massachusetts General Hosp, Boston, MA

Background: Point-of-purchase strategies, such as traffic-light labels and choice architecture, promote healthy food choices. However, there is little research to determine if these interventions reduce caloric intake and prevent weight gain.

Methods: We previously demonstrated that a worksite cafeteria traffic-light labeling and choice architecture intervention increased employees' green (healthy) purchases and reduced red (unhealthy) purchases over 2 years. The objective of the current study is to determine if the intervention reduced calories purchased. We analyzed cafeteria purchases of 5,695 employees who visited the cafeteria during the 3-mo baseline period (Dec 2009-Feb 2010) and the 24-mo intervention period (March 2010-Feb 2012). We compared mean calories purchased per transaction (kcal/transaction) during the baseline quarter to the kcal/transaction purchased during the same 1-year (Dec 2010-Feb 2011) and 2-year (Dec 2011-Feb 2012) quarters. All analyses were adjusted for employee age, gender, race/ethnicity, and job type. To assess potential impact of a change in purchased calories on weight, we analyzed the total calories purchased per quarter (kcal/quarter) by employees who visited the cafeteria frequently (>36 times/quarter). We calculated the combined mean change from baseline in kcal/quarter at 1 and 2-years and divided this number by 90 days to estimate change in daily calories per employee. We predicted the effect of the change in daily calories on employees’ weight using a dynamic model of weight change (Hall, et al. Lancet, 2011).

Results: Employees’ mean age was 34 yrs; 71% were female and 73% white. Mean kcal/transaction was 499.5 at baseline, 478.9 at 1 year, and 470.2 at 2 years (change from baseline to 2 years: -29.3 [95% CI, -33.7, -25.0], p<.001). The decrease in kcal/transaction at 2 years occurred for both food (-17.0, p<.001) and beverages (-17.6, p<.001). At 2 years compared to baseline, kcal/transaction increased for green-labeled items (13.3, p<.001) and decreased for red-labeled items (-42.0, p<.001). Among 461 employees with ≥36 transactions/quarter, mean total calories purchased during the baseline quarter was 37,198 kcal; this decreased by 4,380 kcal/quarter (p<.001) at 1 year and 5,666 kcal/quarter (p<.001) at 2 years relative to baseline. Assuming no other changes in employees’ dietary intake or activity, this equates to a reduction of 56 kcal/day; if maintained over time, the dynamic model of weight change predicts weight loss of 2.8 lbs at 1 year and 5.3 lbs at 3 years.

Conclusions: A traffic-light labeling and choice architecture intervention reduced calories purchased by employees over 2 years. These findings have implications for helping employees manage their weight, particularly those who use the cafeteria regularly. Simple point-of-purchase interventions are important tools for addressing the obesity epidemic.

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Effects of Macronutrients on Serum Short Chain Fatty Acids (SCFA): Results From the Optimal Macro-Nutrient Intake to Prevent Heart Disease (OmniHeart) Trial

Noel T Mueller, Johns Hopkins Univ, Baltimore, MD

Introduction: Emerging evidence links greater concentrations of serum SCFA, derived from microbial fermentation of indigestible fiber in the colon, with better cardiometabolic health. The OmniHeart trial tested the effects of 3 diets that differed in % kcal of carbohydrate, protein, and unsaturated fat; each diet was high in fiber (~30g/day) and isocaloric. Hypothesis: All 3 diets, being high in fiber, would increase SCFAs, but there will be differences between diets.

Methods: The OmniHeart trial is a randomized crossover trial that enrolled 158 men and women, aged 30 years or older, with systolic blood pressure 120–159 mm Hg, diastolic blood pressure < 100 mm Hg. Participants consumed each of 3 different isocaloric diets for 6 weeks in random order: a carbohydrate (CARB)-rich diet (similar to DASH); a protein (PROT)-rich diet with protein predominantly from plant sources; and a diet rich in monounsaturated fat (UNSAT). Fasting serum was collected from participants at baseline, while they consumed their own diet, and at the end of each diet intervention period. SCFAs were measured in stored serum with LC-MS/MS (Metabolon Method TAM148) and normalized by log transformation. We fitted a linear regression model using generalized estimating equations to examine mean change in log-transformed SCFAs from baseline in each diet and between diets.

Results: Compared to baseline diet, all 3 diets increased acetic acid; CARB and UNSAT diets decreased propionic acid; and the PROT diet increased butyric acid (Figure 1, top panels). PROT increased acetic acid more than CARB, but no differently than UNSAT. PROT increased propionic acid compared to both CARB and UNSAT (Figure 1, bottom panels).

Conclusion: All 3 high-fiber OmniHeart diets affected microbiota-derived serum SCFA concentrations with some notable differences between diets. Future research is needed to determine whether changes in SCFA mediate the relationship of dietary change and cardiometabolic disease risk factors.

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The Weight Loss by Using the Smartphone Application for People with Metabolic Abnormalities: A Randomized Controlled Trial

Jung Hyun Lee, Jee-Seon Shim, Hyungseon Yeom, Su Jin Lee, Hyeon Chang Kim, Yonsei Univ, Seoul, Korea, Republic of

Introduction: Obesity has been an important issue for global health. The use of the smartphone application might contribute to weight loss. However, there is still little evidence for the effectiveness among people without overt metabolic disorder. Hypothesis: We assessed the weight loss for people who used the smartphone application with and without personal coaching, with respect to people who did not use any. Methods: A total of 129 participants (aged 30-59 years; 63 men; 66 women) were recruited from the
The inclusion criteria were as follows. 1) no cardiovascular disease; 2) no medication for hypertension, diabetes and dyslipidemia; 3) no current use of the application for behavior modification; 4) at least two components of metabolic syndrome (waist circumference ≥ 90/80 cm (men/women), SBP/DBP ≥ 135/85 mmHg, triglyceride ≥ 150 mg/dL, HDL cholesterol < 40/50 mg/dL (men/women), and fasting glucose ≥ 100 mg/dL). Participants were educated for behavior modification and randomly assigned to three groups; CO (control, no use of the application), AO (the application only; without personal coaching) and APC (the application with personal coaching). The weight was measured during a screening examination and follow-up examinations at 1.5, 3 and 6 months from a start date. A linear mixed model including the data from participants who attended the follow-up examination at least once was used to assess the weight loss.

Results: A total of 111 participants attended the follow-up examination at least once. The mean (±SD) weight of those at screening was 71.6±12.2 kg. The mean weight loss of participants after 6 months was 0.11±1.6 kg (p = 0.67) in CO, 0.34±2.8 kg (p = 0.45) in AO, and 0.96±2.2 kg (p = 0.02) in APC. Compared with the weight loss in CO, there was no significant additional weight loss in AO (0.35 kg; p = 0.41, 0.60 kg after 3 months; p = 0.16 and 0.24 kg after 6 months; p = 0.58), however, there was significant additional weight loss in APC for 3 and 6 months later (0.51 kg after 1.5 months; p = 0.23, 0.93 kg after 3 months; p = 0.03 and 0.87 kg after 6 months; p = 0.04). Conclusions: The use of the application with personal coaching had the effect of losing weight. These results support that the use of the application can be useful for people with metabolic abnormalities that require weight loss.


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with more than 400,000 patients, providing evidence-based interventions. An analysis of almost 4,000 patients within the OMSC primary care network has shown significant increases of rates of Ask, Advise and Act among providers after implementing the program. For patients referred to the OMSC follow-up program, smoking status was assessed for the primary care and hospital programs, respectively. In 2017-18, 60 day outcomes for primary care patients indicated that 22%-57% (125 of 561; 125 of 218) were smoke-free at this time point. For hospitalized patients who reached the 180 day time point, the range was found to be 18%-48% (1156 of 6473; 1156 of 2399). The lower range represents all patients, assuming those not reached have returned to smoking, while the upper range represents only those patients who were reached by the OMSC follow-up program.

Conclusions: With the application of a systematic, evidence-based program, there was an increase in the rates of delivery of smoking cessation best practices by healthcare providers. As a result, more patients made further assisted quit attempts resulting in long-lasting quit rates. The OMSC program has shown to be effective in changing provider behaviour with respect to smoking cessation, and in turn, has helped to increase quit rates among patients who smoke.

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Female Community Health Volunteer-Led Lifestyle Intervention is a Highly Cost-Effective, Low-Cost and Scalable Solution for Blood Pressure Control in Nepal

Dinesh Neupane, Johns Hopkins Univ, Baltimore, MD; Anirudh Krishnan, Duke-NUS Medical Sch, 8 College Road, Singapore; Per Kallestrup, Aarhus Univ, Aarhus, Denmark; Arjun Karki, Patan Acad of Health Sciences, Kathmandu, Nepal; Michael H Olsen, Univ of Southern Denmark, Odense, Denmark; Eric A Finkelstein, Duke-NUS Medical Sch, 8 College Road, Singapore

Introduction: Cardiovascular disease (CVD) has become the leading cause of death worldwide, accounting for 32% of global deaths in 2016. Hypertension, which can be mitigated through diet, exercise and adherence to medication, is the greatest risk factor for CVD. However, public spending on CVD prevention remains low in many low- and middle-income countries partly due to a lack of evidence of low-cost, scalable, cost-effective and evidence-based CVD prevention programs. The goal of this study was to quantify the scalability and cost effectiveness of an evidence-based community-based hypertension management study (COBIN) in Nepal.

Hypothesis: A community health worker-led BP monitoring and lifestyle counseling intervention is a cost-effective solution to achieving greater BP control in Nepal.

Methods: We conducted a cost-effectiveness (CE) and budget impact (BI) analysis of a community health worker-led hypertension prevention and management intervention in Nepal that has previously been shown to reduce BP. Costs were retrospectively collected to estimate per capita and total costs of a national scale-up focusing on three scenarios: (A) hypertensives only; (B) prehypertensives and hypertensives; and (C) all adults aged 25-65.
years. The primary CE measure was incremental cost per CVD disability-adjusted life year (DALY) averted. Both CE and BI analyses were conducted for each scenario. One-way sensitivity analyses were conducted to assess the impact of uncertainty in key parameter values on the primary CE measure.

**Results**: The first-year BI was estimated to be an average of US$0.88 per participant: a total of US$2,698,181, US$5,667,503, and US$10,832,403 in scenarios A, B, and C respectively. In subsequent years costs are roughly half as much. In the base-case CE analysis, scenarios A, B, and C resulted in an incremental cost-effectiveness ratio (ICER) of US$185, US$340, and US$303/DALY respectively. One-way sensitivity analyses around the base-case analysis for scenario C show that the ICER was most sensitive to uncertainty in the estimate of SBP reduction among normotensives, varying the ICER between US$225 and US$465/DALY.

**Conclusions**: The program is highly cost-effective in all three scenarios compared to the WHO threshold of US$835/DALY for Nepal. This work presents the first evidence from Nepal that a community-based hypertension prevention and management program can be a cost-effective, low-cost, and scalable solution to control blood pressure nationwide.


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Funding Component: MP72

**The Effects of Antihypertensive Class on Falls, Syncope, and Orthostatic Hypotension in Older Adults: the ALLHAT Trial**

Stephen P Juraschek, BIDMC-Harvard Medical Sch, Boston, MA; Lara M Simpson, Barry R Davis, Univ of Texas Health Science Ctr at Houston, Houston, TX; Jennifer L Beach, Anthony Ishak, Kenneth J Mukamal, BIDMC-Harvard Medical Sch, Boston, MA

**Background** Hypertension treatment is believed to contribute to falls, syncope, and orthostatic hypotension (OH), common events among older adults. Whether choice of antihypertensive agent influences the incidence of these adverse outcomes is unknown.

**Hypothesis** Chlorthalidone and atenolol are associated with higher risk of fall, syncope, and OH, compared with amlopidine or lisinopril.

**Methods** The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) was a randomized clinical trial that compared the effects of first-step therapy with amlopidine, lisinopril, or chlorthalidone on fatal coronary heart disease or nonfatal myocardial infarction (1994-2002). We linked participants to CMS and VA claims to determine the incidence of fall, syncope, OH, or a composite outcome (any of fall, syncope, or OH), using Cox regression. The association of baseline or 1-month add-on atenolol use with outcomes was determined via Cox models adjusted for age, sex, race, and randomized drug assignment.

**Results** Among 23,964 participants (mean age 70.4 ± 6.7 years, 43% women, 31% black), 927 participants took atenolol at baseline. Over a mean follow-up of 4.9 years, there were 267 fall, 755 syncope, 249 OH, and 1,157 composite claims with no significant differences in the cumulative incidence of events across randomized drug assignments (Figure). Compared with chlorthalidone, amlopidine and lisinopril were not associated with falls (HR [95%CI]: 1.36 [0.90-2.05] and 0.80 [0.47-1.36], respectively), syncope (0.96 [0.77-1.21] and 1.07 [0.85-1.34], respectively), OH (0.98 [0.66-1.45] and 1.24 [0.87-1.76], respectively), or the composite outcome (1.01 [0.84-1.21] and 1.07 [0.92-1.22], respectively). Similarly, atenolol use was not associated with any of the 3 individual or composite claims.

**Conclusions** Choice of antihypertensive agent has no effect on risk of fall, syncope, or OH in older adults. This observation should simplify the choice of
initiating antihypertensive therapy in this population.


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P001

Greater Time Spent in Ideal Cardiovascular Health in Adulthood is Associated With Lower Risk of Cardiometabolic Outcomes and Death: the Framingham Heart Study

Laura Corlin, Boston Univ, Dept of Med, Boston, MA; Meghan I Short, Boston Univ, Sch of Public Health, Boston, MA; Ramachandran S Vasan, Vanessa Xanthakis, Boston Univ, Dept of Med, Boston, MA

Introduction: The AHA ideal cardiovascular health (CVH) metric evaluated on a single occasion is associated with risk of cardiovascular disease (CVD). It is unclear if greater time spent in ideal CVH during midlife influences morbidity and mortality.

Hypothesis: We hypothesized that maintenance of ideal CVH for a longer duration in midlife is associated with lower risk of hypertension, diabetes mellitus, chronic kidney disease (CKD), atrial fibrillation, CVD, CVD sub-types (coronary heart disease, stroke, congestive heart failure, and peripheral artery disease), and all-cause mortality.

Methods: We evaluated 2609 Framingham Offspring Study participants (mean age 61 years; 54% women) who attended examination cycle 7 [1998-2001]. CVH scores were calculated using smoking status, diet, physical activity, total serum cholesterol, resting blood pressure, body mass index, and fasting blood glucose for a total score of 0-14 (score of 0-7 = poor; 8-11 = intermediate; 12-14 = ideal). We determined time spent in each CVH score category during midlife (using data from examination cycles 5 [1991-1995] through 7 (6426 person-exams). Incident hypertension, diabetes, and CKD were assessed at sequential follow-up examinations whereas incident atrial fibrillation, CVD, CVD sub-types, and mortality were assessed based on continuous surveillance through 2015. Years spent in a given CVH score category were related to each outcome using proportional hazards regression with discrete (for hypertension, diabetes, and CKD) or continuous (other outcomes) time, adjusted for age, sex, and baseline values (e.g., fasting blood glucose for diabetes).

Results: At examination 7, participants mostly had poor (40%) or intermediate (54%) CVH scores. For each 5-year duration that participants had poor CVH, they were more likely to develop adverse outcomes (Figure).

Conclusions: Maintenance of ideal CVH for a longer duration in midlife may have salutary cardiometabolic benefits and be associated with a lower risk of all-cause mortality.
OBJECTIVE: The AHA Life’s Simple 7 (LS7) defines cardiovascular health with smoking, physical activity, diet quality, body mass index (BMI), blood pressure, total cholesterol, and blood glucose. We examined changes in LS7 score and its components in older adults over seven years of follow-up. METHODS: We analyzed 2,234 adults aged 65+ in the Cardiovascular Health Study who had all LS7 components measured at baseline (1989) and seven years later (1996). We scored each component as ideal (2), intermediate (1), or poor (0). LS7 score was the sum of components, ranging from 0 (worst) to 14 (best), then categorized as ideal (10-14), intermediate (5-9), or poor (0-4). RESULTS: Mean LS7 score at baseline was 8.71, declining by 0.24 points (95% CI: 0.17, 0.31) to 8.47 seven years later. At baseline, LS7 score was ideal in 35% of participants, intermediate in 63%, and poor in 1.7%. Seven years later, the distribution shifted down, with 31% scoring ideal, 67% scoring intermediate, and 2.0% scoring poor. Of those scoring ideal at baseline, 57% (95% CI: 53%, 60%) maintained ideal scores seven years later (Figure, Panel A). Of those scoring intermediate at baseline (Panel B), 18% (95% CI: 16%, 20%) improved to ideal. Of those scoring poor at baseline (Panel C), 76% (95% CI: 63%, 90%) improved to intermediate, but none improved to ideal. For components, maintenance of baseline ideal status was 95% for smoking, 86% for glucose, 80% for BMI, 77% for cholesterol, and 55% for physical activity, but only 35% for blood pressure and 7% for diet (Panel A). Decline of baseline intermediate status to poor was 33% for blood pressure and 24% for diet (Panel B). Improvement of baseline poor status to intermediate or ideal was >50% for cholesterol and physical activity and >40% for smoking and diet (Panel C). CONCLUSIONS: While cardiovascular health declined on average in an aging population, some older adults improved their cardiovascular health as they aged. Declines in diet quality and blood pressure control contributed to overall declines in cardiovascular health.
Introduction: Advocating for comprehensive smoke-free policies is a priority for many community-based organizations. However, it is difficult to appeal to law makers and gain community support without being able to estimate the population-level health outcomes that could result from new policy. Hypothesis: We expect that by using agent based modeling, we can estimate the effects of comprehensive smoke-free policy in a way that is useful for community-level decision making. Methods: Using an agent-based model, we were able to estimate the potential effects of comprehensive smoke-free policies both Arlington and Mesquite, Texas. The model simulates the intervention effects based on established effect sizes from published literature. The simulation was conducted in 2017 and was used to determine the effects of policy change on reducing CVD risk over a 10- and 20-year periods. Results: In Arlington, Texas, the smoke-free policy was estimated to decrease population rates for myocardial infarction from 4.9% to 4.7%, stroke from 3.0% to 2.7%, and diabetes from 20.3% to 20.2% over 10 years. The effect of the comprehensive smoke free policy was more pronounced over a 20-year period, with all effects being statistically significant (p<.001). In Mesquite, Texas, the policy did not have a significant impact on the proportion of population experiencing stroke in 10 years (p=.107). However, in 20 years, the policy was shown to decrease the rate of diabetes from 29.5% to 28.4%, myocardial infarction from 8.5% to 7.9%, and stroke from 3.3% to 3.0%, all of which are statistically significant (p<.001). Conclusions: This data is helpful in understanding the potential community-level impact of policy on cardiovascular health over time. Population-level health interventions are powerful tools, however, the length of time that they take to show an impact limits uptake. By using systems modeling, we can estimate the potential long-term impacts of policies and garner intervention support in a timelier manner. In conclusion, this tool can be used to build support for smoke-free policies or other CVD interventions in a variety of communities.


Funding: No

Funding Component:

P003

Evaluating Comprehensive Smoke Free Policy at the Community Level Using Systems Modeling

Whitney R Garney, Kristen M Garcia, Texas A&M Univ, College Station, TX
Purpose/Aims: To examine usability (e.g., efficiency, learnability) and acceptability (e.g., user experience, perceived control) of the activity-aware medication prompting application and pillbox in a sample of adults at risk of CVD. Background: Medication adherence has been identified as one potentially modifiable factor that contributes to increased morbidity and remains a great challenge for many adults at risk of CVD due to decreased knowledge of medication self-management. Novel strategies have been proposed to improve medication adherence. However, medication adherence outcomes have primarily been tracked using self-report and therefore success with these interventions varies widely. It is important to measure and take into account end users’ perceptions of usability and acceptability of these technologies as they are being developed. Methods: A software algorithm was developed and tested in adults at risk of CVD (N=12) to recognize daily behavior contexts using machine learning combined with automated activity discovery. Participants were given the pillbox device to use for 8 weeks, from which medication adherence rates were monitored. Usability and acceptability of the platform were assessed at study completion using a Usability Survey and open-ended questions. Results: Participants (33.3 % male; mean age 55.00, ±10.57) reported moderate to high levels of usefulness and acceptability (see Table). Participants claimed that the platform and pillbox devices were useful, user-friendly and easy to learn and understand, but did not feel that it helped them understand their illness, influence a change in health habits or impact their feelings of control. Implications: This study highlights the importance of seeking end-user feedback in the development of intelligent technologies. Participants’ perceptions of usability and acceptability are warranted to ensure that these applications will achieve their intended aim of improving medication adherence and ultimately human health and health care delivery.
Medical Science, Otsu, Japan; Akihiko Shiino, Dept of Neurosurgery, Shiga Univ of Medical Science, Otsu, Japan; Randi Chen, Kuakini Medical Ctr, Honolulu, HI; George W Ross, Veterans Affairs Pacific Islands Health Care System, Honolulu, HI; Bradley Willcox, The John A. Hartford Fndn Ctr of Excellence in Geriatrics, Dept of Geriatric Med, John A. Burns Sch of Med, Univ of Hawaii, Honolulu, HI; Katsuyuki Miura, Dept of Public Health, Shiga Univ of Medical Science, Otsu, Japan; Hirotsugu Ueshima, Ctr for Epidemiologic Res in Asia, Shiga Univ of Medical Science, Otsu, Japan; Kamal Masaki, The John A. Hartford Fndn Ctr of Excellence in Geriatrics, Dept of Geriatric Med, John A. Burns Sch of Med, Univ of Hawaii, Honolulu, HI

Background: The number of people with dementia is increasing in the world and it is of great public health concern. Previous observational studies, mainly from western countries, have reported that modifiable factors for development of dementia were cardiometabolic risk factors, related to genetically determined metabolic abilities and lifestyle. There are no studies comparing which modifiable factors relate to low cognitive scores among populations with the same genetic background but different lifestyle.

Objective: The purpose of the present study is to describe factors related to low cognitive scores in Japanese men in two cohorts that are genetically similar but with different lifestyle exposures.

Methods: Population-based cross-sectional data from the Kuakini Honolulu-Asia Aging Study (HAAS) in Hawaii and Shiga Epidemiological Study of Subclinical Atherosclerosis (SESSA) in Japan were analyzed. Participants were Japanese men aged 71-81 years (2,628 men in Hawaii and 349 men in Japan). Cognitive function was assessed using the Cognitive Abilities Screening Instrument (CASI), with low CASI score < 82. Related factors were obtained by questionnaire and measurements. Multivariable adjusted odds ratios of low CASI score by different factors among the two cohorts were calculated by logistic regression analysis.

Results: Low CASI score was more common in elderly men in Hawaii compared to Japan (21.2% or 556/2,628 versus 12.3% or 43/349, p<0.001). After adjustment for age and educational attainment, these differences were no longer significant (Hawaii 20.3% versus Japan 17.9%, p=0.328). Odds ratios for low cognitive scores were 1.65 in Hawaii with history of stroke, and 1.93 in Japan with history of CHD. Higher odds of low cognitive score were seen with diabetes in Hawaii (OR=1.20), and with BMI≥25 in Japan (OR=1.88).

Conclusion: We found different strengths of associations between cardiovascular diseases and cardiometabolic factors with low cognitive scores among genetically similar men in Hawaii and Japan with different lifestyles.


Funding: No

Funding Component:

P006

Association of Multimorbidity With Cardiovascular Endpoints in Elderly Patients With Atrial Fibrillation

J'Neka S. Claxton, Emory Univ, Atlanta, GA; Alanna M. Chamberlain, Mayo Clinic, Rochester, MN; Pamela L. Lutsey, Univ of Minnesota, Minneapolis, MN; Lin Y. Chen, Univ of Minnesota Medical Sch, Minneapolis, MN; Richard F. MacLehose, Univ of Minnesota, Minneapolis, MN; Lindsay G.S. Bengtson, Optum, Eden Priarie, MN; Alvaro Alonso, Emory Univ, Atlanta, GA

Introduction: The prevalence of atrial fibrillation (AF) and multimorbidity increase
with age; however, the burden imposed by concurrent conditions on outcomes is unknown. Therefore, we aimed to determine the effect of the number and type of comorbid conditions on outcomes in elderly individuals with incident AF.

**Methods:** Patients with non-valvular AF 75 years and older were identified in the MarketScan Medicare Supplemental database from 2007-2015. Fourteen chronic conditions, defined by two occurrences of a diagnostic code from inpatient and outpatient claims prior to or at the time of AF diagnosis, were obtained and classified into two categories: cardiovascular (CV) or non-CV (listed in Table footnote). We used Cox regression to estimate the associations of the number and type of conditions with stroke, severe bleeding, and heart failure hospitalizations (HF).

**Results:** Among 275,617 patients with AF (mean age 83 years, 51% women), 90% had at least one or more additional chronic conditions. The mean (SD) number of conditions per participant was 1.8 (0.9) for CV conditions and 2.1 (1.2) for non-CV conditions. Over a mean follow-up of 23 months, 7,814 strokes, 13,622 severe bleeds, and 19,252 HF events occurred. After adjustment for age, sex, the number of conditions in the other comorbidity group, an increase of one CV condition was associated with greater risk of stroke, severe bleeding, and HF (Table). In contrast, an increase in one non-CV condition was associated with a lower risk of stroke, and a small increase in bleeding and HF risk (Table). After further adjustments for frailty and medications, the strength of the associations within each group decreased across outcomes.

**Conclusion:** CV conditions in AF patients 75 years and older are more strongly associated with stroke, HF, and bleeding than non-CV conditions. This underscores the effect of CV conditions on CV outcomes in a population in which multimorbidity is most common and health care management and delivery is complex.

<table>
<thead>
<tr>
<th>Table: Hazard Ratios for Stroke, Severe Bleeding, and Heart Failure Hospitalizations per One Additional Condition by Comorbidity Group</th>
<th>Cardiovascular conditions</th>
<th>Non-Carlovascular conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1</strong></td>
<td><strong>Model 2</strong></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>1.14 (1.11-1.16)</td>
<td>1.10 (1.07-1.13)</td>
</tr>
<tr>
<td>Severe bleeding</td>
<td>1.17 (1.15-1.19)</td>
<td>1.12 (1.09-1.14)</td>
</tr>
<tr>
<td>Heart Failure hospitalizations</td>
<td>1.46 (1.44-1.48)</td>
<td>1.21 (1.20-1.33)</td>
</tr>
</tbody>
</table>


Funding: Yes

Funding Component: National Center P007

**Age and Gender Differences in Response to Repeat Blood Pressure Measurement After Brief Rest Period**

Sarina Sachdev, Hassan Tahir, Landai Nguyen, Bassam Omar, Christopher Malozzi, G. Mustafa Awan, Farnoosh Rahimi, Univ of South Alabama, Mobile, AL

**Background:** Office-based blood pressure (BP) measurement is a snapshot of a patient’s ambulatory BP, and is subject to variations which may influence management. The objective of this study is to assess the effect of age and gender on repeat BP measurement after a brief rest period in an outpatient cardiology clinic. **Methods:** Patient charts reviewed in University-based cardiology clinic identified 170 encounters which contained BP re-measurement data due to elevated initial BP of > 130/80 mmHg. BP was measured initially by a nurse, with the patient in a sitting position and the arm resting at the level of the heart. If BP was > 130/80 mmHg, it was repeated by physician after resting the patient for 15 minutes. There were: 86 males (51%); 84
females (49%); 113 (66%) elderly patients ≥ 60 years; 57 (34%) younger patients < 60 years.

Results: Allowing 15 minutes of rest resulted in decrease in the systolic BP (SBP) from 153 ± 27 mmHg to 145 ± 27 mmHg (P = 0.003), and decrease in the diastolic BP (DBP) from 87 ± 16 mmHg to 83 ± 15 mmHg (P = 0.04) in the whole patient cohort. The decrease in SBP was 8 mmHg in both males and females (P = NS); while the decrease in DBP was 5 mmHg in males and 2 mmHg in females (P = 0.04). The decrease in SBP was 11 mmHg in the elderly patients compared to 2 mmHg in the younger patients (P = 0.02), while the decrease in DBP was 3 mmHg in the elderly patients compared with 4 mmHg in the younger patients (P = NS). Conclusion: Hypertension is a challenging public health problem. JNC guidelines recommend that prior to BP measurement, persons should be seated quietly for at least 5 minutes in a chair, with feet on the floor, and arm supported at heart level. This resulted in a significant decrease in BP in our patients. In this study we found that, after a brief rest period, males and females decrease SBP to the same extent; males drop DBP greater than females; patients ≥ 60 years of age drop SBP greater than patients < 60 years of age. With a high reported prevalence rates of White-coat hypertension in the elderly, between 15% and 25%, this is a clinically significant observation that reinforces that physicians should remeasure the blood pressure, especially the subset of males and the elderly, in whom a bigger decrement may be detected in blood pressure measurement after a brief rest period.


Funding: No

Funding Component:

P008

Pulse Pressure Following a Brief Patient Rest Period: Age and Gender Variations

Landai Nguyen, Sarina Sachdev, Hassan Tahir, Bassam Omar, Farnoosh Rahimi, Christopher Malozzi, G. Mustafa Awan, Univ of South Alabama, Mobile, AL

Background: Increased pulse pressure (PP) is an independent determinant of cardiovascular disease. The effect of rest period on office-based systolic blood pressure has been previously reported, but not on PP in particular. Whether such rest period impacts the measured pulse pressure, and the variability of such response with age and gender remains unknown. Methods: Patient charts reviewed in University-based cardiology clinic identified 170 encounters which contained blood pressure (BP) re-measurement data due to elevated initial BP of > 130/80 mmHg. BP was measured initially by the nurse, with the patient in a sitting position and the arm resting at the level of the heart. If BP was > 130/80 mmHg, it was repeated by the physician after resting the patient for 15 minutes. There were 112 (66%) elderly patients ≥ 60 years of age and 58 (34%) younger patients < 60 years of age. Among the elderly patients, there were 51 males (46%) and 61 females (54%). Results: Among all encounters, after a brief rest period, initial pulse pressure (PP) of 67 ± 2 mmHg decreased to 62 ± 1 mmHg (5 mmHg; P < 0.01). PP decreased by 8 mmHg in the elderly (72 ± 2 to 64 ± 2 mmHg; P < 0.01) but did not significantly change in the young (56 ± 3 to 58 ± 3 mmHg; P = NS). PP decrease among the elderly was more pronounced in females (11 mmHg; 76 ± 4 to 65 ± 2 mmHg; P < 0.01) compared with males (4 mmHg; 68 ± 3 to 64 ± 2 mmHg; P = 0.03). Conclusion: Hypertension is a challenging public health problem. The new ACC/AHA High Blood Pressure Guidelines have decreased the range for Stage 1 hypertension to systolic blood pressure of 130-139 mmHg, and diastolic blood pressure of 80-89 mmHg, with normal blood pressure as less than 120/80 mmHg. Blood pressure guidelines recommend that prior to BP
measurement, persons should be seated quietly for at least 5 minutes in a chair, with feet on the floor, and arm supported at heart level; which resulted in significant decrease in pulse pressure in our patients. We show that while a decrease in pulse pressure was confined to the elderly, elderly females had a more pronounced PP decrease compared to males; both, however, fell to the same level. White coat hypertension may explain this observation, since it is more frequent in elderly females. The implication of this observation is that physicians should take extra care in re-measuring the blood pressure and pulse pressure, especially in elderly females, in whom a more pronounced drop in pressure may be observed after a brief rest period, and thereby, result in reclassifying their risk and need for treatment.


Funding: No

Funding Component:
P009

Association Between Intracranial Subclinical Vessel Diseases and Cognition in a Community-Based Sample of Japanese Men: Shiga Epidemiological Study of Subclinical Atherosclerosis (SESSA)

Takahiro Ito, Akira Fujiyoshi, Shiga Univ of Medical Science, Otsu, Japan; Takayoshi Ohkubo, Dept of Hygiene and Public Health, Teikyo Univ Sch of Med, Itabashi-ku, Japan; Akihiko Shiino, Biomedical MR Science Ctr, Shiga Univ of Medical Science, Otsu, Japan; Kazuhiro Nozaki, Dept of Neurosurgery, Shiga Univ of Medical Science, Otsu, Japan; Naoko Miyagawa, Sayuki Torii, Takashi Hisamatsu, Katsuyuki Miura, Hirotsugu Ueshima, Shiga Univ of Medical Science, Otsu, Japan

Background and Purpose
Intracranial subclinical vessel diseases are considered important indicators of cognitive impairment. However, comprehensive assessment on various types of vessel disease is lacking. We aim to compare various types of intracranial vessel disease in association with cognitive function among a community-based male population.

Method
The Shiga Epidemiological Study of Subclinical Atherosclerosis (SESSA) randomly recruited and examined participants from Shiga, Japan in 2006-08 at baseline. Among 824 male participants in the follow-up exam (2010-12), we restricted our analyses to those who underwent the Cognitive Abilities Screening Instrument (CASI), cranial magnetic resonance imaging/angiogram (MRI/MRA, 1.5-Tesla), and free of stroke or neurodegenerative disease. Using MRI/MRA, we assessed intracranial arterial stenosis and four types of small vessel diseases: lacunar infarction and microbleed, periventricular hyperintensity (PVH), deep and subcortical white matter hyperintensity (DSWMH). We graded each vessel disease into 3 grades by severity. Cerebral artery stenosis was graded according to the presence of most stenotic lesions in the major 11 vessels: no stenosis (grade 1), 1-50% stenosis at least 1 vessel (grade 2), ≥ 50% stenosis at least 1 vessel (grade 3). Lacunar infarct was graded according to number of infarct: 0 (grade 1), 1-2 (grade 2), >2 (grade 3). Microbleed was graded according to number of microbleed: 0 (grade 1), 1 (grade 2), ≥2 (grade 3). PVH and DSWMH were graded according to Shinohara’s scale (a modified Fazekas scale): scale 0 to 1 (grade 1), scale 2 (grade 2), scale ≥3 (grade 3). Using linear regression, CASI score (ranging from 0 to 100 with a higher score indicating better cognition) was calculated according to the grade of each vessel disease adjusted for age and education year attained.

Results
We analyzed 693 men. Mean (standard deviation) age and CASI score was 67.9 (8.1) years, and 91.2 (5.4), respectively. Significant
inverse trends were observed between disease grade and CASI score for DSWMH and PVH: adjusted CASI scores of grade 1, 2, and 3 were 91.7, 91.2, and 90.4 (P\text{trend} 0.015) for DSWMH, and 91.5, 90.4, and 89.8 (P\text{trend} 0.007) for PVH. No clear trend across the grade was observed in other vessel diseases.

**Conclusion**
Among various types of intracranial subclinical vessel diseases assessed with MRA/MRI, white matter hyperintensity (PVH, and DSWMH) had significant dose-response relationships to cognitive function in a community-based male sample that has a relatively well-preserved cognition level. Our finding suggests that white matter hyperintensity is an important early predictor of cognitive functions among subclinical vessel diseases.


Funding: No

Funding Component:

**P010**

**Do the Pooled Cohort Equations Accurately Predict Cardiovascular Disease Risk in Older Adults?**


**Background:** The ACC/AHA Pooled Cohort Equations (PCE), derived using data from adults ages 40-79, have not been evaluated for accuracy among older adults.

**Methods:** We evaluated 2,667 adults aged ≥75 years without known ASCVD in the NIH pooled cohorts (Framingham, Framingham offspring, MESA, & CHS), stratified by number of major risk factors [smoking, diabetes, lipids (LDL≥130 mg/dL or on lipid-lowering therapy), and BP (≥140/90 mmHg or on BP medication)].

Observed vs. predicted 5-year ASCVD event rates were compared across strata. We also evaluated 5-year PCE model performance overall.

**Results:** At the group level, the PCE somewhat overestimated risk across all strata in Kaplan Meier analysis: observed versus expected was 7.0% vs. 11.0%, (p=0.005) for those with no risk factors (N=429), 12.5% vs. 15.4%, (p<0.001) for those with 1 risk factor (N=1,179), 14.7% vs. 18.4 % (p=0.003) for those with 2 risk factors (N=908), and 24.2% vs. 25.1 % (p=0.54) for those with 3+ risk factors (N=151). The Figure shows the performance of the PCE by decile of predicted risk. In the figure, risk-overestimation appears to be driven by over-estimation of risk in the highest deciles of risk, rather than those at low predicted risk.

**Conclusion:** The PCE can be used to risk-stratify older adults. However, it may over-predict risk, especially in those at the top quartile of risk.

Disclosures:  M. Nanna: None. E. Peterson: None. D. Wojdyla: None. A. Navar: B. Research Grant; Significant; Amgen, Sanofi, Regeneron, Amarin, Janssen. G. Consultant/Advisory Board;
Hypoglycemia Unawareness is Associated With Impaired Cognition Among Older Adults With Type 1 Diabetes: the Study of Longevity in Diabetes


Introduction: Severe hypoglycemia is common among those with type 1 diabetes (T1D). Hypoglycemia unawareness (HU) in T1D increases the risk of severe hypoglycemia more than five-fold. Prior work has established an association between severe hypoglycemia and impaired cognition. However, it is unknown if HU is associated with impaired cognition.

Hypothesis: We hypothesized that HU would be associated with impaired cognition in a large cohort of older adults with T1D.

Methods: We examined the association between HU and cognitive function using baseline data collected on 544 older adults with T1D from the Study of Longevity in Diabetes (SOLID). Self-reported HU was assessed using the 8-item Clarke Hypoglycemia Awareness Questionnaire, which captures frequency of hypoglycemia and awareness of symptoms. Participants with responses indicating ‘reduced awareness’ on ≥4 of the 8 items were categorized as having reduced awareness.

Cognitive tests assessed four cognitive domains identified via factor analysis (language, executive function, episodic memory, attention). All cognitive test scores were standardized. Using generalized linear regression, we examined the association between HU and cognition on each of the four cognitive domains and on global cognition (average of scores on the 4 domains) in models adjusted for age and age, sex, education, race/ethnicity, and diabetes duration.

Results: Overall, 27% of participants (n=149) had reduced hypoglycemia awareness. In fully adjusted models, compared to those with normal awareness, those with reduced hypoglycemia awareness had significantly lower scores on measures of language and global cognition; however, executive function, episodic memory and simple attention did not differ by HU status.

Conclusions: Our results suggest that, among older adults with type 1 diabetes, HU may be associated with poorer cognition, specifically through language-related processes.
outcomes are paramount to preserving health and functional status in a rapidly aging population. Fatigue is a common side-effect of CVD, but is difficult to measure due to its subjectivity and situational dependence. Fatigability anchors fatigue perception to a standardized walking task, and has been associated with poor functional outcomes with aging. Given the modifiable properties of most CVD risk factors, efforts to prevent the onset and progression of fatigability with aging may benefit from evaluation of -and interventions to treat- components of cardiovascular risk.

**Hypothesis**
Older adults with greater CVD risk have higher fatigability, which is primarily contributed by hypertension.

**Methods**
From 2007-2015, 623 participants of the Baltimore Longitudinal Study of Aging (BLSA) underwent ≥ 2 perceived fatigability and health history assessments. The mean follow-up time is 4.5 years. At baseline, the sex-specific predicted 10-year CVD risk scores were calculated using the Framingham CVD risk score (Framingham) and the Pooled Cohort Equation (ASCVD). At the most recent visit, perceived fatigability was assessed immediately following a slow-paced 5-minute treadmill walk (1.5 mph; 0.67 m/s; 0% grade) using the Borg rating of perceived exertion (RPE; range 6-20). Linear model was used to conduct a cross-sectional analysis.

**Results**
At baseline, participants ranged in age from 32-95 years (mean 68.1±12.0, 56.8% women, 27.6% black), with average CVD risk scores of 17.5±10.5 (Framingham) and 16.8±12.8 (ASCVD), and average fatigability RPE of 8.7±2.4. In crude continuous models, a 5% increase in CVD risk score corresponded to a 0.43 higher RPE (Framingham (p<0.001)) and 0.40 higher RPE (ASCVD (p<0.001)). After adjusting for age, sex, BMI, number of chronic diseases and alcohol intake, the association with the ASCVD score remained essentially unchanged (β=0.08, p=0.198). Among the primary CVD risk predictors, older age was the largest contributor to higher perceived fatigability (β=0.47, p<0.001), followed by female sex (β=0.12, p=0.001), and hypertension (β=0.10, p=0.005), with diabetes showing a trend (β=0.06, p=0.11). Stratified analyses suggested this association was stronger among those aged ≤70 years (p<0.008) and those with obesity (p<0.002).

**Conclusions**
Perceived fatigability was higher among participants with greater 10-year CVD risk as measured using the Framingham and the ASCVD risk scores. The strong associations with hypertension and obesity suggest interventions to reduce CVD risk may also lower fatigability, particularly among those aged ≤70 years or living with obesity.


Funding: No

Funding Component:

P013

**Serum Uric Acid is Not Associated With Incident Dementia in the ARIC-NCS Cohort**

Aniya B. Alam, Rollins Sch of Public Health, Emory Univ, Atlanta, GA; Aozhou Wu, Bloomberg Sch of Public Health, Johns Hopkins Univ, Baltimore, MD; Melinda C. Power, Milken Sch of Public Health, George Washington Univ, Washington D.C., DC; Nancy West, Univ of Mississippi Medical Ctr, Jackson, MS; Alvaro Alonso, Rollins Sch of Public Health, Emory Univ, Atlanta, GA

**Background**
Recent studies have investigated the involvement of serum uric acid (SUA) in the progression of cognitive decline and dementia with conflicting results. SUA is known to be
associated with hypertension, inflammation, and other cardiovascular risk factors, which often contribute to dementia and dementia-like morbidity, yet several cross-sectional studies have suggested that its antioxidant properties may be protective against cognitive decline.

**Hypothesis**
We hypothesized lower levels of serum uric acid at baseline would be associated with an increased risk of incident dementia.

**Methods**
The ARIC study is an ongoing, biracial, community-based cohort study in the US with longitudinal data first collected in 1987. Participants were examined during follow-up throughout 6 visits (last one 2016-17). Serum uric acid measurements were collected through fasting blood samples in 1990-92 (age range 47-70 years), baseline for this analysis. Incident dementia was determined based on examiner assessments at visits 5 (2011-13) and 6 (2016-17), dementia surveillance based on dementia screeners conducted over telephone interviews starting from visit 5, hospitalization discharge codes, and death certificates prior to visit 6. We estimated the association of SUA, categorized into quartiles, with incidence of dementia by calculating hazard ratios (HR) using Cox regression models adjusting for potential confounders.

**Results**
Our analysis included 11,452 participants free of dementia, prevalent coronary heart disease, or stroke, and with available SUA followed for a median of 24.1 years. Baseline SUA in the highest quartile was associated with incident dementia [HR (95% CI): 1.22 (1.07, 1.38)] when adjusted for age, race, gender, and education level. However, after full adjustment including cardiovascular risk factors, this relationship disappeared (Table).

**Conclusion**
Within a large community-based cohort, we found no evidence of SUA’s influence on incident dementia independent of cardiovascular risk factors.

<table>
<thead>
<tr>
<th>Quartile of SUA</th>
<th>Person Years of Follow-Up</th>
<th>Number Developing Dementia</th>
<th>HR</th>
<th>Model 1** HR</th>
<th>Model 2*** HR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(mg/dL)</td>
<td></td>
<td></td>
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<tr>
<td>Quartile 1</td>
<td>&lt;1.20 mg/dL</td>
<td>50500</td>
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<td>513</td>
<td>1.00 (Reference)</td>
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<tr>
<td>Quartile 3</td>
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<td>49536</td>
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<td>Quartile 4</td>
<td>&gt;2.50 mg/dL</td>
<td>73892</td>
<td>651</td>
<td>1.00 (Reference)</td>
<td>1.00 (Reference)</td>
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</table>

Disclosures: A.B. Alam: None. A. Wu: None. M.C. Power: None. N. West: None. A. Alonso: None.

Funding: No

Funding Component:

**P014**

**Aortic Stiffness and Late-life Depression: the Atherosclerosis Risk in Communities Neurocognitive Study (ARIC-NCS)**

Jingkai Wei, Priya Palta, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Kenneth R Butler, Univ of Mississippi Medical Ctr, Jackson, MS; Mariana Lazo, Johns Hopkins Univ, Baltimore, MD; Benjamin D Capistrant, Smith Coll, Northampton, MA; Thomas H Mosley, Univ of Mississippi Medical Ctr, Jackson, MS; Gerardo Heiss, Univ of North Carolina at Chapel Hill, Chapel Hill, NC

Introduction: Late-life depression, which occurs at the age of 65 years or older, is a heterogeneous syndrome associated with cognitive decline and dementia. Aortic stiffness increases pulsatility, which damages microvascular circulation, resulting in poor vasoreactivity and cerebral hypoperfusion that is related to late-life depression. However, only few studies that relate aortic stiffness to late-life depression. Hypothesis: Higher aortic stiffness is associated with greater depressive symptoms and a higher prevalence of late-life depression. Methods: A total of 4,392 ARIC-NCS participants (mean age: 75.2±5.0 years; 40% women; age range: 65-97 years) were included. Aortic stiffness was measured using the finite element method (FEM) at the ascending aorta and the area under the curve (AUC) of the pulse wave velocity (PWV) was calculated. Results: The study found that aortic stiffness was independently associated with depression scores (β = 0.03, p < 0.001) and the prevalence of late-life depression (β = 0.02, p < 0.001). Conclusion: Aortic stiffness is a potential biomarker for late-life depression and may provide insights into the pathophysiology of this syndrome.
male; 21% Black) with measurements of aortic stiffness and depressive symptoms in 2011-2013 were included in this cross-sectional analysis. Aortic stiffness was assessed as carotid-femoral pulse wave velocity (cfPWV) using the VP-1000 plus system (Omron Co., Ltd., Japan). cfPWV was dichotomized based on the upper 25th percentile. The 11-item short form of the Center for Epidemiological Studies Depression Scale (CES-D) was used to assess depressive symptoms. Depressive symptoms were calculated as the sum of scores obtained from the 11 items addressing appetite, depressed feelings, sense of effort, restless sleep, feeling happy, sad, or lonely, perceiving others as unfriendly, enjoying life, feeling disliked, and not able to get going (score range: 0 to 22). The CES-D score was quantified as both a binary and a continuous variable. Individuals were categorized as depressed if CES-D score ≥ 8. The total CES-D was log-transformed due to right skewed distribution (mean: 3.1; median: 2.0). Multivariable linear regression was used to estimate the association between high cfPWV and CES-D score, and multivariable logistic regression was used to estimate the association between high cfPWV and odds of depression. All models were adjusted for age, sex, race-center, education, self-reported financial situation, smoking, alcohol use, body mass index, LDL cholesterol, prevalent hypertension, diabetes and coronary heart disease. Race and sex were tested as potential effect measure modifiers.

Results: A total of 412 (9.4%) participants were depressed. Compared to participants with less stiff aortas (cfPWV < 13.11 m/s), those with stiffer aortas (cfPWV ≥ 13.11 m/s) had higher average CES-D scores (3.5 vs. 2.9, respectively) and a higher prevalence of depression (12.9% vs 8.2%, respectively). High cfPWV was associated with 6% higher depressive symptoms (beta (β): 0.06, 95% confidence interval (CI): 0.002, 0.13), and greater odds of depression (odds ratio (OR): 1.32, 95% CI: 1.03, 1.69). No significant interactions were found by race or sex. Conclusion: Aortic stiffness is associated with late-life depression. These results suggest a role for age-related hemodynamic properties as targets for the study of late-life depression and the mitigation of its burden.


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P015

Biomarkers Representing Key Aging-related Biological Pathways Are Associated With Subclinical Atherosclerosis: the Framingham Study

Cecilia Castro-Diehl, Section of Preventive Med and Epidemiology, Boston Univ, Boston, MA; Rachel Q. Ehrbar, Dept of Biostatistics, Boston Univ Sch of Public Health, Boston, MA; Ramachandran S. Vasan, Vanessa Xanthakis, Section of Preventive Med and Epidemiology, Boston Univ, Boston, MA

Background: Increased oxidative stress, telomere attrition, endothelial dysfunction and alterations in insulin-like growth factor-1 are key molecular mechanisms of aging. We hypothesized that biomarkers representing these aging-related biological pathways are associated with measures of subclinical atherosclerosis. Methods and Results: We evaluated up to 2,314 Framingham Offspring Study participants attending routine examination cycles (mean age 58 yrs, 55% women) with available biomarkers of key aging-related pathways: leukocyte telomere length [expressed by terminal restriction fragment; TRF]; urinary concentrations of creatinine corrected isoprostanes [an index of systemic oxidative stress]; circulating concentrations of insulin-like growth factor [IGF-1]; and asymmetrical dimethylarginine [ADMA; a marker of endothelial dysfunction]. We related each biomarker as independent variable to the
presence of subclinical atherosclerosis (dependent variable) defined as presence of coronary artery calcium (CAC modeled as [ln(CAC+1)]), and carotid intimo-medial thickness (IMT; defined as the average of standardized values of common carotid and internal carotid artery IMT) using multivariable linear regression models adjusting for age, sex, body mass index, systolic blood pressure, diabetes, smoking status, hypertension, and total cholesterol/HDL. In multivariable-adjusted models, higher ADMA levels were associated with higher CAC values (β_{ADMA} per 1-SD increase 0.25; 95% confidence interval [CI] [0.09,0.41]). Shorter TRF length and lower IGF-1 values were associated with higher IMT values (β_{TRF} -0.08; 95%CI [-0.14, -0.01] and β_{IGF-1} -0.04; 95%CI [-0.08, -0.01]). Levels of isoprostanes were not associated with either CAC or IMT. Conclusions: We observed differential patterns of associations between aging-related biomarkers and measures of subclinical atherosclerosis. Additional studies are warranted to elucidate the molecular mechanisms that underlie these association patterns.

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P016

Lifestyle Factors Substantially Contributed to Urban-Rural Disparity in All-Cause Mortality Among the Oldest-Old in China

Shangzhi Xiong, Yaxi Li, Duke Kunshan Univ, Kunshan, China; Lijing Yan, Duke Univ, Durham, NC

Introduction
With rapid population aging, the number of the oldest old population (≥ 80 years old) will increase dramatically in the coming decades in China. In this population, previous studies have demonstrated large health disparities between urban and rural China. Using the Chinese Longitudinal Healthy Longevity Survey (CLHLS), we aim to assess the hypothesis that individual-level lifestyle factors contribute to the disparity in all-cause mortality of the oldest old between urban and rural China.

Methods
The CLHLS study sampled 862 randomly selected counties and districts in 22 of the 34 provinces in China. Our study included a total of 32,999 oldest old residents (13,767 urban, 19,232 rural) from seven waves of the CLHLS: 1998, 2000, 2002, 2005, 2008, 2011-12, and 2014. Five lifestyle factors were examined: smoking, drinking, diet (fruits, vegetables, fish, eggs, salted vegetables, sugar, tea, garlic, meat, and beans), physical activity, and leisure activity (housework, fieldwork, reading, petting, majong, gardening, and watching television). All-cause mortality was ascertained through death registry and information from next of kin with a median follow up of 2.3 years (range: 1-16.5 years). We used Cox Proportional Hazard Models to examine the urban-rural disparity of all-cause mortality: the basic model including residence (rural/urban) and demographic variables (age, gender, education, occupation, marriage, co-residence, and ethnic), five separate models including each lifestyle factor and all variables in the basic model, and a model with all lifestyle factors added to the basic model.

Results
There were significant differences between urban and rural participants in their smoking, drinking, physical activity, diet, and leisure activities (P<0.005 for all). All seven Cox Regression models showed large urban-rural
disparities in mortality. The basic model showed that rural mortality was 11.2% higher than urban (95% Confidence Interval: 8.2, 14.3). Adjusting for diet, physical activity, and leisure activities, separately reduced the disparity by 10.3%, 25.3%, and 34.7% respectively. Adjusting for smoking and drinking did not cause substantial changes to the disparity. When put together in the same model, these five lifestyle factors collectively reduced the disparity by 37.5%.

Conclusions
In conclusion, lifestyle factors, especially diet, physical activity, and leisure activities, contributed substantially to the urban-rural disparity in all-cause mortality of the oldest old in China. Interventions and policies targeting lifestyle factors are expected to reduce the disparity in China among the oldest old population.

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Funding Component:

P017

Biomarkers Representing Aging-Related Biological Pathways Are Associated With All-Cause Mortality: The Framingham Study

Cecilia Castro-Diehl, Rachel Q Ehrbar, Ramachandran S. Vasan, Vanessa Xanthakis, Section of Preventive Med and Epidemiology, Boston, MA

Background: Chronological aging is the result of different biological processes and molecular mechanisms that, if identified, may increase our ability to mitigate aging-related decline in body functions. We hypothesized that aging-related biomarkers reflecting multiple biological pathways are associated with all-cause mortality.

Methods and Results: We related leukocyte telomere length (LTL) expressed by terminal restriction fragment (TRF) length, urinary concentrations of creatinine-corrected isoprostanes, circulating concentrations of insulin-like growth factor (IGF)-1, and asymmetrical dimethylarginine (ADMA) in up to 2314 Framingham Offspring Study participants attending routine examination cycles (mean age 58 yrs, 55% women) to all-cause mortality using Cox proportional hazards regression models. Biomarkers were modeled individually and in combination, adjusting for age, sex, body mass index, systolic blood pressure, diabetes, smoking status, hypertension medication, total cholesterol/HDL. We created also a biomarker score as a composite of biomarkers associated with mortality risk. Kaplan Meier curves were created (Figure) to graphically present the survival time as a function of tertiles of the biomarker score. There were 593 deaths (274 women) during a median follow-up of 20 years. TRF and IGF-1 values were inversely related to all-cause mortality (multivariable-adjusted hazard ratios [HR] per SD increase, 0.86, 95% confidence interval [CI], 0.75-0.998 and 0.89, 95% CI 0.81-0.97 for TRF and IGF-1, respectively). Isoprostanes and ADMA values were positively related to all-cause mortality (multivariable-adjusted HR per SD increase, 1.17, 95% CI, 1.11-1.23, and 1.09, 95% CI, 1.01-1.18, respectively).

Conclusion: In our prospective community-based study, aging-related biomarkers were associated with all-cause mortality, supporting the concept that molecular pathways represented by these biomarkers may reflect the processing of aging in the community.
Smoking and Cognitive Decline at Older Age: Using Surveillance and Imputation to Deal With Differential Mortality

Aozhou Wu, A. Richey Sharrett, Jennifer A. Deal, Karen Bandeen-Roche, Johns Hopkins Univ, Baltimore, MD; Andreea Rawlings, Oregon State Univ, Corvallis, OR; Melinda C. Power, George Washington Univ, Washington, DC; Alden L. Gross, Johns Hopkins Univ, Baltimore, MD; David Couper, Univ of North Carolina, Chapel Hill, NC; Michael Griswold, Thomas Mosley, Univ of Mississippi Medical Ctr, Jackson, MS; Rebecca F. Gottesman, Josef Coresh, Johns Hopkins Univ, Baltimore, MD

Background: Smoking is a risk factor for vascular diseases and likely associated with cognitive decline. However, observed associations may be impacted by higher cohort attrition, particularly mortality, among smokers. We incorporated surveillance data between visits using multiple imputation by chained equations (MICE) and assumed the Missing At Random mechanism in missing cognitive function. We assessed the impact of addressing the influence of differential visit attendance driven by mortality on the association of smoking with cognitive decline. Methods: We studied 4,960 participants in Atherosclerosis Risk in Communities (ARIC) Neurocognitive Study, who were free from dementia at baseline (2011-2013) with cognitive batteries at baseline and follow-up (2016-2017, N = 3,078). Cognitive decline was measured as change in standardized global cognitive factor scores. Self-reported smoking was collected at previous visits (1987-1998) and annual follow-up interviews (1998 to 2011) of the ARIC study, and pack years were estimated. We used baseline factor scores, dementia risk factors, and cognitive function screening at annual follow-ups and dementia surveillance information after baseline to impute missing factor scores. Cognitive decline was analyzed using linear regression on both complete data and using MICE. Results: Participants had a mean age of 75.7 (SD: 5.1) at the index visit. 59.6% (2956 of 4960) were female and 18.6% (921 of 4960) were African American. Smoking ≥25 pack-years prior to baseline was associated with moderately lower visit attendance and higher mortality at older age. The association of smoking with cognitive decline was stronger after addressing differential attrition driven by mortality using MICE for smoking ≥25 pack-years, with two-fold increase in the effect size (Table 1). Conclusions: Smoking, particularly of longer duration and intensity, is a risk factor for cognitive decline, with larger effect size when dealing with the differentially higher mortality among heavier smokers.

Background:
Dementia is increasingly appreciated to have important vascular disease contributions. Albuminuria and decreased estimated glomerular filtration rate (eGFR) define chronic kidney disease (CKD) and are related to the risk of its consequences as well as microvascular disease and endothelial damage across multiple vascular beds. We extend previous studies by examining albuminuria and eGFR measured at both mid-life and older age as risk factors for dementia.

Methods:
We studied 10,876 adult participants in the Atherosclerosis Risk in Communities (ARIC) Study excluding participants with end-stage renal disease, stroke and incident dementia at baseline. We analyzed the adjusted relative hazard of incident dementia as a function of eGFR (linear spine with a knot at 60 ml/min per 1.73m²) and log urinary albumin-creatinine-ratio (UACR) adjusting for age, sex, race, education level, Apolipoprotein E4 level, smoking, alcohol consumption, body mass index, diabetes and hypertension. We used two different baseline visits: (1) Starting in 1996-1999 (Visit 4, age 54-74 years); (2) Starting 2011-2013 (Visit 5, age 70-90 years) with follow-up to 2017.

Results:
We observed 2,001 dementia cases over 16 years of follow-up (446 after Visit 5). Risk of dementia increased with higher levels of albuminuria with a stronger magnitude at older-age than in midlife (see table). Estimated GFR was more weakly associated with dementia (p>0.05 at both baselines). The albuminuria association was consistent across sex and race (p-interaction>0.05).

Conclusion:
Albuminuria, a marker of kidney disease and endothelial damage, is strongly related to dementia incidence. Albuminuria’s association with dementia is stronger in late-life unlike other vascular risk factors, where the association is weaker at older age.


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P019

Novel Serum Metabolites Associate With Grip Strength Among Bogalusa Heart Study Participants

Jovia L Nierenberg, Jiang He, Tulane Univ, New Orleans, LA; Changwei Li, Univ of Georgia, Athens, GA; Xiaoying Gu, Shengxi Li, Lydia A Bazzano, Wei Chen, Tulane Univ, New Orleans, LA; Jason Kinchen, Metabolon Inc, Morrisville, NC; Tanika N Kelly, Tulane Univ, New Orleans, LA
**Introduction:** Hand grip strength is a simple and non-invasive measure for frailty and pre-frailty in aging populations. It has been shown to predict cardiovascular disease events, disability, fracture risk, and all-cause mortality. However, the biological pathways underlying frailty remain largely unknown.

**Hypothesis:** Serum metabolites may associate with grip strength, among a middle aged biracial population.

**Methods:** Untargeted ultrahigh performance liquid chromatography-tandem mass spectroscopy was used to detect and quantify serum metabolites among 825 white and 436 African-American participants of the Bogalusa Heart Study. Grip strength was measured in kg, and was averaged between both hands. We used race stratified and combined multivariate adjusted linear regression to examine associations between single metabolites and grip strength (mean: 35.14 kg, standard deviation: 11.85 kg), adjusted for age, sex, body mass index, kidney function, education, cigarette smoking, alcohol drinking, and race (in combined analyses). Significant metabolites were identified as those achieving Bonferroni corrected significance (P<4.16×10^{-5}) in one race group and the entire cohort, with a similar trend observed in the other race group.

**Results:** Six novel associated metabolites were identified, comprised of amino acid (polyamine), carbohydrate (aminosugar), and nucleotide (purine metabolism, adenine containing, and pyrimidine metabolism, cytidine or uracil containing) subpathways (Table). Participants with higher levels of these metabolites had lower grip strength.

**Conclusions:** This analysis identified novel metabolites associated with grip strength, providing insight into the biological pathways of frailty.

<table>
<thead>
<tr>
<th>Metabolite</th>
<th>Combined</th>
<th>African-American</th>
<th>White</th>
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</thead>
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<tr>
<td></td>
<td><strong>Concentrations (µmol/L)</strong></td>
<td><strong>P-Value</strong></td>
<td><strong>Concentrations (µmol/L)</strong></td>
</tr>
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<td>Alanine Acid</td>
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<td>1.94 (0.23)</td>
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<td>2.09 (0.30)</td>
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<td>Glutamine</td>
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<td>-0.35 (0.57)</td>
<td>-0.28 (0.80)</td>
<td>-0.18 (0.51)</td>
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</table>

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Funding Component:

**P021**

Cardiac Biomarkers, Electrolytes, and Anemia with Arrhythmias over Two Weeks in Chronic Kidney Disease: The Atherosclerosis Risk in Communities (ARIC) Study

Esther Kim, Johns Hopkins Sch of Public Health, Baltimore, MD; Ron C Hoogeveen, Baylor Coll of Med, Houston, TX; Elizabeth Selvin, Johns Hopkins Sch of Public Health, Baltimore, MD; Christie M Ballantyne, Baylor Coll of Med, Houston, TX; Elsayed Z Soliman, Wake Forest Sch of Med, Winston-Salem, NC; Josef Coresh, Kunihiro Matsushita, Johns Hopkins Sch of Public Health, Baltimore, MD; Lin Y Chen, Univ of Minnesota, Minneapolis, MN

**Background:** Chronic kidney disease (CKD) increases the risk of arrhythmias and sudden cardiac death; however, it is unclear whether this association is due to cardiac overload, cardiac injury, electrolyte abnormalities, anemia, or all of the above. We therefore investigated the relationships between several biomarkers representing these conditions with various arrhythmias among CKD.

**Methods:** In 2016-17 (visit 5), 2187 older participants (71-94 years) in the ARIC Study underwent 2-week continuous heart rhythm monitoring (Zio XT Patch). We conducted a cross-sectional study of 1276 participants with CKD. We used modified Poisson regression to examine the associations of natriuretic peptide (NT-proBNP) representing cardiac overload, high-sensitivity cardiac troponin-T (hs-cTnT) reflecting cardiac injury, potassium and magnesium (electrolyte abnormalities), and hemoglobin (anemia) with arrhythmias.
detected during the 2-week period: atrial fibrillation (AF), non-sustained ventricular tachycardia (NSVT), long pause (>3 sec), Mobitz II or complete atrioventricular block (AVB), and ventricular ectopy (VE).

**Results:** There were 9% with AF, 33% with NSVT, 4% with long pause, 2% with AVB, and 29% with VE. NT-proBNP was associated with all arrhythmias except AVB (Table 1). Higher hs-cTnT was associated with AF, NSVT, and VE. Lower potassium below 4.2 mmol/L was associated with AF while lower magnesium below <2 mg/dL was associated with VE. Hemoglobin showed no associations with arrhythmias.

**Conclusions:** Of the plausible mechanisms contributing to arrhythmias in CKD, biomarkers of cardiac overload and injury were associated with most arrhythmias tested. Lower potassium and lower magnesium demonstrated a significant relationship with AF and VE, respectively. Our results suggest cardiac alterations as key conditions behind high arrhythmic burden in CKD, with somewhat limited contributions of electrolytes and anemia.


**Funding:** No

**Funding Component:**

P023

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**Predictors of Oral Anticoagulation Resumption Among Atrial Fibrillation Patients Surviving an Intracranial Hemorrhage**

**Nemin Chen,** Terri Newman, Meiqi He, Inmaculada Hernandez, Univ of Pittsburgh, Pittsburgh, PA

**Background** The clinical benefit of resuming oral anticoagulation (OAC) in atrial fibrillation (AF) patients who have survived an intracranial hemorrhage (ICH) remains unclear. It is important to understand what patient characteristics affect whether patients are restarted on OAC after an ICH. **Hypothesis** We hypothesized that younger patients, those without chronic kidney disease, and at high stroke risk would be more likely to restart OAC.

**Methods** Using claims data from a 5% random sample of Medicare beneficiaries, we selected patients with a diagnosis of non-valvular AF who experienced an ICH while using OAC (n=4,822). The primary outcome was OAC resumption at 12 weeks after ICH. Among patients who restarted OAC, we further evaluated the likelihood of resuming warfarin versus direct oral anticoagulants (DOACs). We constructed multivariate logistic regression to evaluate the association between a comprehensive list of demographics and clinical characteristics (list in table) and OAC resumption. **Results** Among the 4,822 patients, 1,766 (37%) restarted OAC during the first 12 weeks. Among them, 280 (16%) started direct oral anticoagulants, and 1,486 (84%) started warfarin. Younger patients, those eligible for Medicaid, with a previous ischemic stroke and higher CHA\textsubscript{2}-DS\textsubscript{2}-VASc score were more likely to restart OAC (Table). Among participants who resumed OAC in 12 weeks, patients with a history of ischemic stroke were less likely to use DOACs; however, those with a higher risk of bleeding, measured by HAS-BLED score, were more likely to use them. **Conclusion** Around 35% of AF patients who survived an ICH restarted OAC within 12 weeks of the ICH, and among them, most used warfarin. Although a history of ischemic stroke increased the odds of...
OAC resumption, it decreased the odds of using DOACs.


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Funding Component: P024

Hidden Risks: Relationship Among Visceral Adipose Tissue, Interleukin-18, and Adiponectin in the Development of Type 2 Diabetes in Filipino Americans

Julian Leandro Gallegos Jr., Touro Univ California, Vallejo, CA; Ruth Taylor-Piliae, Thaddeus Pace, Univ of Arizona, Tucson, AZ; Matthew Gallek, Univ of North Carolina, Willmington, NC; Leslie Ritter, Univ of Arizona, Tucson, AZ

Background and Aims: Filipino Americans (FAs) are at high risk for developing type 2 diabetes however little research exists as to why this occurs. There is evidence that pro-inflammatory Interleukin-18 (IL-18) and anti-inflammatory (adiponectin) markers associated with visceral adipose tissue (VAT) may explain this risk but this postulate has not yet been examined during the course of diabetes progression in FAs. Therefore, in FAs without diabetes, with prediabetes and with type 2 diabetes, the aims of this study were to: 1) Quantify VAT, IL-18, and adiponectin and describe the values in relation to known reference ranges (RR) for each group 2) Determine the relationships of VAT, IL-18, and adiponectin within each group and 3) Determine if VAT, IL-18, and adiponectin were different among groups.

Methods: FAs were recruited from healthcare and community centers in Solano County, California. VAT was measured using the InBody 570 body impedance analyzer. Blood was obtained for HgA1c and plasma was used to quantify IL-18 and adiponectin with ELISA. Correlation coefficients were conducted to determine the associations among VAT, IL-18, and adiponectin in the three groups. One-way ANOVAs were conducted for each biomarker to determine if there were statistically significant differences among groups.

Results: Seventy-five participants enrolled (N=25 per group), 68% females with mean age=42 years. VAT values above the RR included 57% of women, but only 27% of men. Participants with an IL-18 above the RR used for this study was greater in the pre-diabetes (68%) and diabetes groups (64%) vs. the non-diabetes group (40%). Interestingly, 90-100% of the adiponectin values in both men and women were well above the RR. There were no correlations among the biomarkers within any group. VAT and IL-18 were not significantly different among groups. Adiponectin was significantly different among groups (F=3.789, p=0.03), with lower values in the diabetes group vs. the non-diabetes group (Post-hoc Tukey HSD test, p=0.02).

Conclusions: This is the first time VAT, IL-18 and adiponectin have been examined in FAs without diabetes, with prediabetes and with diabetes. While a young, mostly female sample may have confounded the biomarker findings, the results point toward the potential usefulness of inflammation-related biomarkers to identify individuals in the FA population that may be at higher risk for type 2 diabetes and understand the mechanisms of diabetes development and progression in FAs.
Sex Differences in the Association Between Ideal Cardiovascular Health and Biomarkers of Cardiovascular Disease: The Multi-Ethnic Study of Atherosclerosis

Olatokunbo I Osibogun, Florida Intl Univ, Miami, FL; Oluseye Ogunmoroti, Johns Hopkins Ciccarone Ctr for the Prevention of Cardiovascular Disease, Baltimore, MD; Eve-Marie Benson, John Hopkins Ciccarone Ctr for the Prevention of Cardiovascular Disease, Baltimore, MD; Martin Tibuakuu, Dept of Med, St Luke's Hosp, Chesterfield, MO; Erin D. Michos, Johns Hopkins Ciccarone Ctr for the Prevention of Cardiovascular Disease, Baltimore, MD

Background: Several biomarkers have been shown to be useful clinical tools for the early detection and prognostication of incident cardiovascular disease (CVD) among women and men. The American Heart Association Life’s Simple 7 metrics are a useful construct for the promotion of ideal cardiovascular health (CVH). However, little is known about sex differences in the relation of CVH with these CVD-related biomarkers. We examined the association between CVH and CVD-related biomarkers among women and men free of clinical CVD.

Methods: This is a cross-sectional study of 5,388 participants aged 45 to 84 years enrolled in the Multi-Ethnic Study of Atherosclerosis. The CVH score ranged from 0 to 14 and was derived from 7 metrics (smoking, body mass index, physical activity, diet, total cholesterol, blood pressure and blood glucose). Each metric category was scored as 0 points (poor), 1 point (intermediate) and 2 points (ideal). The CVD-related biomarkers (C-reactive protein, D-dimer, fibrinogen, homocysteine, cardiac troponin T and NT-proBNP) were logarithmically transformed for the analyses. We examined the association between the CVH score (higher score = more favorable) and CVD-related biomarkers using multivariable linear regression.

Results: Mean age (SD) was 62 (10) and 52% were women. In adjusted regression analyses, higher CVH scores were associated with lower concentrations of all biomarkers, except for NT-proBNP where there was a positive association (Table). For example, in the overall population, a 1-unit increment in the CVH score corresponded to a 0.13 mg/L lower log (CRP) concentration. Interactions by sex for all biomarkers examined were significant at p < 0.001, but results were qualitatively similar between women and men.

Conclusion: A more favorable CVH score was associated with lower levels of multiple CVD-related biomarkers for women and men, except for NT-proBNP. These data suggest that promotion of ideal CVH would have similarly favorable impact on the reduction of biomarkers of risk among both women and men.

Perceived Discrimination and Trajectory of High-Sensitivity C-Reactive Protein: The Jackson Heart Study

Kendra D Sims, Oregon State Univ, Corvallis, OR; Mario Sims, Univ of Mississippi Medical Ctr, Jackson, MS; LáShauntá Glover, Ellen Smit, Oregon State Univ, Corvallis, OR; Michelle C. Odden, Stanford Univ, Stanford, OR

Introduction: Perceiving discriminatory treatment against oneself may induce a stress response, and over time contribute to cardiovascular pathophysiology. The study evaluated the association of self-reported discrimination and changes in high-sensitivity C-reactive protein (hs-CRP), a marker of systemic inflammation predictive of incident cardiovascular disease.

Hypothesis: We assessed the following hypotheses: 1) higher levels of perceived discrimination are associated with higher serum hs-CRP at baseline, 2) over 13 years of follow-up, greater mean increases in hs-CRP are observed among those with higher levels of baseline discrimination than those with lower levels of discrimination, and 3) body composition mediates the longitudinal trajectory.

Methods: The sample included 5145 African American participants, aged 21-92, in the Jackson Heart Study. Multiple imputation addressed missingness in baseline sociodemographic (e.g., age, sex, education), behavioral (e.g., AHA smoking and physical activity categorizations) and clinical covariates (e.g., estimated glomerular filtration rate, diastolic blood pressure, hemoglobin A1c) as well as in hs-CRP taken at all three study examinations. Everyday, lifetime, and burden from perceived discrimination -attributed to reasons including race, gender, age, or weight-comprised primary predictors in three sets of multivariable linear regression models of baseline (2000-2004) discrimination and In(hs-CRP). Linear mixed models (LMMs) were fitted to assess mean changes in ln(hs-CRP) between three study examinations (2000-2013). Mediation was quantified by percent changes in estimates adjusted for the adiposity measures BMI, waist circumference, or waist-to-height ratio.

Results: In the cross-sectional analyses, those in the highest tertile of lifetime discrimination had adjusted ln(hs-CRP) levels 0.08 ln(mg/dL) lower than those in the lowest tertile (95% CI= -0.16, -0.01). However, the ln(hs-CRP) increases among those reporting more frequent everyday discrimination were 0.07 ln(mg/dL) higher per examination than those reporting no everyday discrimination (95% CI=0.01, 0.12) A similar trend emerged for lifetime discrimination and changes in ln(hs-CRP) (adjusted mean increase per visit: 0.04 ln(mg/dL), CI=0.01, 0.08). BMI, waist circumference, or waist-to-height ratio did not mediate the longitudinal associations between any discrimination measure and hs-CRP. In sensitivity analyses, the magnitude of these estimates did not change before or after multiple imputation.

Conclusion: Everyday and lifetime discrimination were associated with significant hs-CRP increases over 13 years of follow-up. These conclusions build upon the existing research that indicates the physiological response to discrimination may lead to systemic inflammation and in turn cardiovascular disease.


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P028

Gut Microbiota-Related Metabolites and Long-Term Bone Health in Response to Weight-Loss Diets: The POUNDS Lost Trial

Tao Zhou, Yoriko Heianza, Yuhang Chen, Dianjianyi Sun, Tulane Univ, new orleans, LA; Xiaofang Pei, Sichuan Univ, Chengdu, China;
Introduction Weight-loss diet interventions affect gut microbiota-related metabolites, such as trimethylamine N-oxide (TMAO) and its precursors (choline and L-carnitine), and improve cardiometabolic status. However, little is known about how these metabolites may affect bone mineral density (BMD) during weight loss. Hypothesis We assessed the hypothesis that changes in gut microbiota-related metabolites are related to changes in BMD during weight loss. Methods A total of 264 overweight and obese participants with measurement of BMD by dual-energy X-ray (DEXA) scan were included in the present analysis. The participants were randomly assigned to one of four diets varying in macronutrient intakes. We investigated the associations of changes in plasma levels of TMAO, choline, and L-carnitine from baseline to 6 months with changes in BMD. Results and Conclusions We found that changes in plasma levels of TMAO from baseline to 6 months were positively related to changes of whole body (P=0.011) and spine (P=0.002) BMD over the 2-year intervention, independent of weight change. The association with whole body BMD was also significant at 6 months. The correlations between changes in TMAO and BMD were not modified by dietary macronutrients; while changes in TMAO precursor L-carnitine showed interactions with dietary fat intake on changes of spine and trochanter BMD (all P<0.05). Participants with the least L-carnitine decrease showed less BMD reduction by eating a low-fat diet (P_{spine}=0.031 and P_{trochanter}=0.017). In conclusion, our results suggest that decrease in TMAO during weight loss may be related to reduction in BMD.
hyperthyroidism, should explain some mechanisms of the association subclinical thyroid disorders and coronary heart disease. Methods: We tested this hypothesis among 5060 men and women aged 35 to 74 years-old enrolled in the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil) at baseline. Subclinical thyroid disorders were defined as thyroid-stimulating hormone (TSH) >4 IU/ml (subclinical hypothyroidism) and TSH <0.4 IU/ml (subclinical hyperthyroidism) with normal free-thyroxine levels. The variable of exposure was GlycA measured in serum by proton nuclear magnetic resonance (1H NMR) spectroscopy at (LabCorp, Raleigh, NC). We excluded participants who reported previous cardiovascular disease, use of lipid-lowering agents or drugs that interfere with thyroid function. The cross-sectional relationship between GlycA and subclinical hyperthyroidism and subclinical thyroid was evaluated separately by linear regression models using the category of the subjects with euthyroidism as the reference. Both crude unadjusted and adjusted (age, sex, race, education, smoking, alcohol use, physical activity body-mass index, hypertension, diabetes, smoking, alcohol use, and physical activity data are presented Results: After exclusions, we analyzed 47 individuals with subclinical hyperthyroidism (mean age 53.1 (±9.4) years; 61.7% women), 258 with subclinical hypothyroidism (mean age 52.3 (±8.9); 58.1% of women) and 3,642 participants with normal thyroid function (mean age: 50.1 (±8.6); 52% of women). Crude linear regression models showed no significant association between GlycA and subclinical hyperthyroidism (Beta-coefficient [B], 15.77; P = 0.10) or subclinical hypothyroidism (B, 3.60; P=0.39). Results remained nonsignificant after multivariate adjustment for subclinical hyperthyroidism (B, 12.96; P=0.15) and subclinical hypothyroidism (B, 0.44; P=0.91). Conclusions: There is no association between subclinical thyroid disorders and GlycA. Other presumptive inflammatory pathways should be contemplated in further studies addressing the link between subclinical thyroid disorders and coronary heart disease.

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P030

Association of Ideal Cardiovascular Health and Plasminogen Activator Inhibitor-1 From Early Adulthood to Middle Age: the Coronary Artery Risk Development in Young Adults Study

Lauren Y Lee, Douglas E Vaughan, Laura Colangelo, Donald M Lloyd-Jones, Sadiya S Khan, Northwestern Univ Feinberg Sch of Med, Chicago, IL

Background: Ideal cardiovascular health (CVH) is associated with a lower incidence of cardiovascular disease (CVD). Therefore identification of biomarkers that may mediate risk between CVH and CVD may offer novel approaches in CVD prevention. One potential biomarker is plasminogen activator inhibitor-1 (PAI-1), which has been associated with increased risk of CVD. The aim of this study is to assess the relationship between CVH scores and PAI-1 levels from young adulthood to mid-life. Methods: Plasma PAI-1 levels were measured in a subset of randomly selected participants (n=1200) from the Coronary Artery Risk Development in Young Adults (CARDIA) study at year 7 (Y7) and Y20. Among them, 911 participants at Y7 and 830 participants at Y20 had available data on CVH status. We calculated CVH scores (range 0-14) and categorized as low (0-7), moderate (8-11), and high (12-14). We performed multivariable linear regression to study the association of CVH and PAI-1 at Y7 and Y20 after adjustment for age, sex, race, education, and center. Results: At Y7, participants (mean age 32.3±3.5 years) had a mean CVH score of 11.1 (+1.8) and
mean PAI-1 level of 20.0 ng/mL (+21.2) with an adjusted correlation coefficient of -0.29 (p<0.0001) (TABLE). By Y20, mean CVH score of the participants had declined to 10.1 (+2.3) and mean PAI-1 level had increased to 36.2 ng/mL (+37.1) with an adjusted correlation coefficient of -0.46 (p<0.0001). Among participants with high, moderate, and low CVH, PAI-1 levels were higher at Y20 compared to Y7 (high: 14.7 to 18.0 ng/mL, moderate: 23.9 to 36.9 ng/mL, low: 27.3 to 64.6 ng/mL). At both Y7 and Y20, mean level of PAI-1 was significantly higher in participants with moderate or low CVH (compared with high CVH).

**Conclusion:** Higher CVH score is associated with lower plasma levels of PAI-1 from young adulthood to mid-life. PAI-1 levels increased among all CVH categories with aging; however, participants with high CVH had the smallest increase in PAI-1 and PAI-1 levels remained lower than even young adults with moderate or low CVH.

**Table 1.** Association of cardiovascular health score and circulating plasminogen activator inhibitor-1 levels from young adulthood to mid-life

<table>
<thead>
<tr>
<th></th>
<th>Composite CVH score (SD)</th>
<th>Year 7 (n=810)</th>
<th>Year 20 (n=810)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean PAI-1 level, ng/mL (SD)</td>
<td>20.1 (+21.2)</td>
<td>20.1 (+21.2)</td>
<td>20.1 (+21.2)</td>
</tr>
<tr>
<td>Adjusted mean PAI-1 (ng/mL (SD)) by categories:</td>
<td>Low CVH</td>
<td>Moderate CVH</td>
<td>High CVH</td>
</tr>
<tr>
<td>27.3 (+1.3)</td>
<td>23.9 (+1.9)</td>
<td>14.7 (+1.4)</td>
<td></td>
</tr>
<tr>
<td>p &lt; 0.0001</td>
<td>p &lt; 0.0001</td>
<td>p &lt; 0.0001</td>
<td></td>
</tr>
</tbody>
</table>


Funding: No

Funding Component:

P031

**Plasma Xanthine Oxidoreductase Activity is Associated With Endothelial Dysfunction and Increased Arterial Stiffness in a General Japanese Population: the Iwate Tohoku Medical Megabank Project**

Yuka Kotozaki, Kozo Tanno, Hideki Ohmomo, Iwate Tohoku Medical Megabank Organization, Iwate Medical Univ, Yahaba, Japan; Fumitaka Tanaka, Div of Nephrology and Hypertension, Dept of Internal Med, Iwate Medical Univ, Morioka, Japan; Ryotomo, Atsushi Shimizu, Kiyomi Sakata, Jiro Hitomi, Makoto Sasaki, Mamoru Satoh, Iwate Tohoku Medical Megabank Organization, Iwate Medical Univ, Yahaba, Japan

An increase in xanthine oxidoreductase (XOR) activity is related to various diseases such as diabetes, hypertension and obesity has been reported. However, so far the association with XOR activity and pathogenesis of atherosclerosis in a general Japanese population are not known. The purpose of this study is to investigate the association between XOR activity and progression of atherosclerosis including pulse wave velocity (PWV) and flow mediated dilation (FMD) in a general Japanese population.

The Iwate Tohoku Medical Megabank Organization pooled individual participant data from a general population-based cohort study in Iwate prefecture (n = 810, male / female = 271 / 539, age = 67.6 ± 7.2).

Plasma levels of XOR activity in males were marginally higher than in females (89.6 ± 187.0 vs. 64.8 ± 145.8 pmol / h/ mL, p = 0.06). Arterial stiffness by PWV after log10 transformation was significantly higher in quartiles III and IV of XOR compared to quartiles I in females (F =4.768, p < 0.01) (quartiles I vs. III, 3.187 ± 0.081 vs. 3.217 ± 0.081, p < 0.01; quartiles I vs. IV, 3.187 ± 0.081 vs. 3.213 ± 0.080, p < 0.05). Endothelial function as assessed by FMD was significantly lower in quartiles III and IV compared to quartiles I in females (F = 6.074, p < 0.001) (quartiles I vs. III, 6.02 ± 3.19 vs. 4.90 ± 2.66 %, p < 0.01; quartiles I vs. IV, 6.02 ± 3.19 vs. 5.04 ± 2.76 %, p < 0.01).

XOR activity was related to progression of atherosclerosis (FMD, OR = 0.930, p = 0.06) and the high risk for CVD in females (Suita Score ≥ 41, OR = 1.92, 95% confidence interval (CI) = 1.04 - 3.54, p < 0.05). XOR activity was no significant association with progression of atherosclerosis and the high risk for CVD in males. The area under the curve (AUC) for XOR...
activity combined with Suita score was 0.66 (95% CI = 0.52 - 0.77, p < 0.05).

In conclusion, XOR activity is associated with endothelial dysfunction and increased arterial stiffness suggesting that elevated XOR activity may relate to progression of atherosclerosis and indicate the CV risk.


Funding: No

Funding Component: 
P032

**Soluble CD14 Level is a Coronary Heart Disease Risk Factor in Younger-aged Black Adults of the Reasons for Geographical and Racial Differences in Stroke (REGARDS) Study**

Nels C. Olson, Insu Koh, Univ of Vermont, Colchester, VT; Alex P. Reiner, Univ of Washington, Seattle, WA; Suzanne E. Judd, Marguerite R. Irvin, George Howard, Univ of Alabama at Birmingham, Birmingham, AL; Neil A. Zakai, Mary Cushman, Univ of Vermont, Colchester, VT

**Introduction:** CD14 plays an important role in the innate immune response and promotes inflammation. Soluble CD14 (sCD14) is produced during an acute phase response and following cleavage from immune cell surfaces upon activation. Higher sCD14 may be a risk factor for cardiovascular disease, however prospective studies evaluating sCD14 with incident coronary heart disease (CHD) events are limited. We examined the association of sCD14 levels with incident CHD in black and white REGARDS participants. **Methods:** REGARDS enrolled 30,239 participants from across the contiguous U.S. in 2003-07. The cohort was 55% female and 41% black by design. In a nested case-cohort study, sCD14 levels were measured by ELISA in 612 participants with incident CHD and 856 in a cohort random sample; all were free of CHD at baseline. Using Cox proportional hazards models we calculated the hazards ratio (HR) of CHD for increasing sCD14, and studied interactions of sCD14 with age, sex, or race.

**Results:** In models adjusted for Framingham risk factors, interaction terms for sCD14-by-race (p-interaction=0.02) and sCD14-by-age (p-interaction=0.02) were statistically significant but not for sCD14-by-sex (p=0.21). Stratified by race and age, each 1-SD higher sCD14 (442 ng/mL) was associated with an increased CHD risk in blacks but not whites (Table). Relationships were stronger in younger than older black participants. SCD14 was not significantly associated with CHD risk among white participants, but there was a trend for stronger relationships at younger ages.

**Conclusions:** Higher sCD14 is associated with risk of CHD in blacks with greater risk at younger ages. These findings suggest sCD14 may be an important CHD risk factor among younger black adults.

**Table:** Associations of soluble CD14 with CHD stratified by race and age in REGARDS.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Black CHD</th>
<th>White CHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>2.90 (1.45, 3.65)</td>
<td>1.56 (0.94, 2.57)</td>
</tr>
<tr>
<td>55</td>
<td>1.27 (1.15, 2.51)</td>
<td>1.24 (0.88, 1.80)</td>
</tr>
<tr>
<td>65</td>
<td>1.91 (1.11, 3.31)</td>
<td>1.59 (0.90, 1.31)</td>
</tr>
<tr>
<td>75</td>
<td>1.23 (0.95, 1.58)</td>
<td>0.73 (0.66, 1.04)</td>
</tr>
</tbody>
</table>


Funding: No

Funding Component: 
P033

**NT-proBNP as a Biomarker to Detect Salt Sensitivity**
Finding a biomarker to identify salt sensitive individuals would be an important step in the personalized management of hypertension. The natriuretic peptide, amino terminal pro-type B natriuretic peptide NT-proBNP, secreted by the heart in response to volume overload, is positively associated with incident hypertension. We hypothesized that when exposed to low salt diets, individuals with elevated NT-proBNP (≥ 100 pg/mL) will have a greater decrease in systolic blood pressure than those with NT-proBNP within the physiological range (40 - 90 pg/mL). Methods: Individuals with systolic/diastolic blood pressures greater than 120/85 mmHg and NT-proBNP values ≥ 40 pg/mL were included if they were not on blood pressure lowering medications and were free of cardiovascular or renal disease, diabetes, chronic obstructive pulmonary disease, pulmonary hypertension or any condition that would be associated with secondary causes of hypertension. Low salt diets consisted of meals containing total sodium 50 mmol/day. Meals were prepared at the Fairview University Hospital kitchen and provided to each participant for 10 days. Subjects were instructed to eat only the meals provided by the study. Sitting blood pressure, NT-proBNP, plasma glucose, sodium, creatinine and urinary sodium and creatinine were measured before and after 10 days on the low salt diet. Urinary creatinine and sodium was determined in 24-hour urine on day 10. Statistical analysis. Change (blood pressure after - blood pressure before low salt diet) in systolic blood pressure values were linearly regressed on log transformed NT-proBNP values. Results: 9 individuals (5 females) mean (SD) age 58.3 (8.1) years were classified into physiological (7.8) pg/mL (n = 4) and an elevated 165.7 (84.5) pg/mL (n = 5) category of NT-proBNP, respectively, p = 0.18. Body mass index and plasma glucose, sodium and creatinine at baseline were also similar between the two groups. Following 10 days of low salt diet, systolic blood pressure decreased by a mean (SE) 16.9 (6.8) mmHg in those with elevated levels of NT-proBNP and by 10.9 (3.3) mmHg in those with physiological levels of NT-proBNP, p = 0.4. Baseline log NT-proBNP was inversely associated with change in systolic blood pressure r = - 0.60, p = 0.09. For log NT-proBNP values between 3.697 and 5.745 pg/mL, every log unit increase in NT-proBNP at baseline was associated with a mean (range) systolic blood pressure decrease of 10.4 (5 - 37.7) mmHg, p = 0.09. Conclusions: Results from a large-scale study are required to confirm the findings from this small pilot study that elevated values of NT-proBNP can predict who will have a decrease in systolic blood pressure in response to a low sodium diet.


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Funding Component: P034

Circulating Odd-Chain Fatty Acids in Relation to Intake of Dairy and Fiber in Post-Myocardial Infarction Patients

Kamalita Pertiwi, Leanne K. Küpers, Wageningen Univ and Res, Wageningen, Netherlands; Anne J. Wanders, Peter L. Zock, Unilever Res and Development, Vlaardingen, Netherlands; Johanna M. Geleijnse, Wageningen Univ and Res, Wageningen, Netherlands

Background: Odd-chain fatty acids (OCFA) pentadecanoic (15:0) and heptadecanoic acid (17:0) are
considered to reflect dairy intakes in studies on cardiometabolic outcomes. A recent randomized controlled trial on dietary fiber showed that circulating proportions of these OCFA may also be related to fiber intake, which may result from fermentation by gut microbes.

**Objective**: To examine the associations between circulating OCFA and dairy and fiber intake in patients with a history of myocardial infarction.

**Methods**: We performed cross-sectional analyses in a subsample of 896 Dutch post-MI patients of the Alpha Omega Cohort. Proportions of OCFA (as % of total fatty acids) were measured in plasma phospholipids (PL) and cholesterol esters (CE). Dietary intakes (g/d) were assessed using a 203-item validated food frequency questionnaire. Spearman correlations (r) were computed between circulating OCFA in PL and CE and intakes of total dairy, types of dairy products, dietary fiber and total meat.

**Results**: Patients were on average 69 years old, 78% was male and 89% used statins. Dairy intake was predominantly from milk and yogurt. PL 15:0 was positively correlated with total dairy intake (r=0.16, p<0.001; Table 1), especially yogurt. PL 15:0 was not correlated with dietary fiber (r=0.01, p=0.75). For CE 15:0, correlations were similar. PL 17:0 was positively correlated with total dairy (r=0.15, p<0.001), but also with dietary fiber (r=0.13, p<0.001). For CE 17:0 similar correlations were observed, although somewhat weaker (dairy: r=0.10, p=0.003; fiber: r=0.09, p=0.009). OCFA were not significantly correlated with meat intake.

**Conclusions**: Plasma PL 15:0 and CE 15:0 were related to dairy and not to fiber intake. PL 17:0 and CE 17:0 were equally related to dairy and fiber intake. Cardiometabolic health benefits attributed to biomarkers of dairy intake, especially 17:0, may be (partly) attributable to fiber intake. Further research is needed into endogenous OCFA synthesis as a result of fermentation of dietary fiber by gut microbes.

Table 1: Correlations between circulating 15:0 and 17:0 and intake of total dairy, fiber and meat in 896 patients of the Alpha Omega Cohort.

<table>
<thead>
<tr>
<th>Dietary intake (g/d)</th>
<th>PL 15:0</th>
<th>CE 15:0</th>
<th>PL 17:0</th>
<th>CE 17:0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total dairy</td>
<td>0.01</td>
<td>0.16</td>
<td>0.01</td>
<td>0.09</td>
</tr>
<tr>
<td>Milk</td>
<td>0.15</td>
<td>0.15</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>Yogurt</td>
<td>0.01</td>
<td>0.17</td>
<td>0.17</td>
<td>0.17</td>
</tr>
<tr>
<td>Cheese</td>
<td>0.01</td>
<td>0.14</td>
<td>0.14</td>
<td>0.14</td>
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</table>


Funding: No

Funding Component:

**P035**

**Habitual Aerobic Exercise-Induced Decrease in Circulating C1q Level is Associated With Reduction of Cardiovascular Diseases Risks in the Elderly**

Natsuki Hasegawa, Naoki Horii, Shumpei Fujie, Masataka Uchida, Kiyoshi Sanada, Takafumi Hamaoka, Motoyuki Iemitsu, Ritsumeikan Univ, Kusatsu, Japan

**INTRODUCTION**: Habitual aerobic exercise leads to reduction of arterial wall thickness and arterial stiffness with aging. Recently, C1q has been identified as a novel myokine, and the expression of muscle C1q mRNA increases with aging. Additionally, in vivo and in vitro studies, C1q induces proliferation of vascular smooth muscle cells. However, it remains unclear whether the secretion of myokines, C1q, TNF-alpha and IL-6 are related to the changes in cardiovascular disease risk by aging and regular exercise.

**PURPOSE**: This study aimed to clarify whether serum C1q, TNF-alpha and IL-6 levels are associated with the changes in
cardiovascular disease risks with aging and regular aerobic exercise. METHODS: In a cross-sectional study, 127 healthy male and female subjects (18-81 years) were enrolled in this study. Subjects were divided into two groups; young (<40 year) and middle-aged and older (≥40 year) groups. Serum C1q, TNF-alpha, IL-6 levels were determined by ELISA. Risks of cardiovascular disease were estimated by using carotid-femoral pulse wave velocity (cfPWV) and common carotid intima-media thickness (cIMT). Additionally, in an intervention study, thirteen older male subjects were randomly divided into two groups: aerobic training group (AT: n=6) and a sedentary control group (Con: n=7). subjects in the AT group completed 8 wk of aerobic exercise training (60-70% peak oxygen uptake for 45 min, 3 days/wk). RESULTS: In the cross-sectional study, serum C1q, TNF-alpha and IL-6 levels, cfPWV and cIMT were significantly higher in middle-aged and older group as compared with young group (respectively p<0.05). Positive correlations between cfPWV and serum C1q (r=0.41, p<0.05), TNF-alpha (r=0.28, p<0.05) or IL-6 (r=0.26, p<0.05) levels were seen. Additionally, cIMT was positively correlated with only serum C1q (r=0.67, p<0.05). After adjusting for TNF-alpha and IL-6, the association between the serum C1q and cfPWV (β=0.44, p<0.05) or cIMT (β=0.83, p<0.05) remained statistically significant. Additionally, in the intervention study, cfPWV and serum C1q level significantly decreased after AT intervention (each P<0.05). Furthermore, the AT-induced change in serum C1q level was positively correlated with AT-induced change in cfPWV (r=0.65, P<0.05) and cIMT (r=0.59, P<0.05). CONCLUSION: These results suggest that circulating C1q level may reflect the changes of arterial stiffness and thickness with aging and regular exercise, and the reduction of serum C1q level in response to regular aerobic exercise may contribute to the reduction in cardiovascular disease risks in the elderly.


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Funding Component:
P036

Association Between Circulating Galectin-3 and Arterial Stiffness in the Atherosclerosis Risk in Communities Study

Xiaoming Jia, Baylor Coll of Med, Houston, TX; Hirofumi Tanaka, Univ of Texas at Austin, Austin, TX; Christie M Ballantyne, Wensheng Sun, Baylor Coll of Med, Houston, TX; Amil M Shah, Brigham and Women's Hosp, Boston, MA; Ron C Hoogeveen, Baylor Coll of Med, Houston, TX; David Aguilar, Univ of Texas Health Science Ctr at Houston, Houston, TX; Chiadi E Ndumele, Johns Hopkins Univ, Baltimore, MD; Eric Boerwinkle, Univ of Texas Health Science Ctr at Houston, Houston, TX; Salim Virani, Baylor Coll of Med, Houston, TX; Elizabeth Selvin, Johns Hopkins Univ, Baltimore, MD; Gerardo Heiss, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Vijay Nambi, Baylor Coll of Med, Houston, TX

Introduction: Galectin-3 (gal-3) is a B-galactoside-binding lectin and is associated with increased risk of heart failure and other adverse cardiovascular outcomes. Circulating gal-3 has been implicated in promoting tissue fibrosis, leading to vascular remodeling and resultant arterial stiffening. Hypothesis: Plasma gal-3 levels will be associated with central arterial stiffness in a community-based population. Methods: We conducted a cross-sectional analysis of 4,073 participants from the Atherosclerosis Risk in Communities (ARIC) Study who attended visit 5 (2011-2013), with a mean age of 75.1±5.0 years. Central arterial stiffness was measured by carotid-femoral pulse wave velocity (cfPWV). Association between gal-3 and arterial stiffness was assessed using multivariable linear regression
models with gal-3 (log transformed) and adjustment first for age, sex, race-center, heart rate, current smoking, mean arterial pressure and use of anti-hypertensive medication (model 1), then for model 1 plus body mass index (BMI), diabetes, hypertension, LDL cholesterol and estimated glomerular filtration rate (eGFR) (model 2). **Results:** The median gal-3 concentration was 16.5 ng/mL (p25, p75: 13.8, 19.8) and mean cfPWV was 1163 (SD, 303) cm/s. Higher gal-3 concentrations corresponded with higher mean cfPWV and central pulse pressure (p-trends <0.001). Higher gal-3 levels were also associated with higher BMI, diabetes, hypertension, LDL cholesterol, cholesterol lowering medication use, prevalent coronary artery disease, and lower eGFR. In regression analysis, gal-3 was significantly associated with cfPWV in model 1 (β=46.0; 95% CI 15.4-76.6, per natural log higher gal-3, p=0.003). Further adjustment in model 2 strongly attenuated the association and the coefficient was no longer significant (β=25.0; 95% CI -8.2-58.2, per natural log increase in gal-3, p=0.14). **Conclusions:** Higher levels of gal-3, a known promoter of tissue fibrosis, were associated with greater central arterial stiffness. In addition, circulating gal-3 levels were also associated with many traditional risk factors such as BMI, diabetes, hypertension and eGFR; adjustment for these factors attenuated the association of gal-3 with arterial stiffness measures, suggesting mediation of the gal-3 association.


Funding: No

**Funding Component:** P037

**Independent and Joint Associations of 25-Hydroxy Vitamin D and Parathyroid Hormone Levels With Cardiometabolic Biomarkers Among American White and Black Postmenopausal Women**

**Jin Xia, Wanzhu Tu, Indiana Univ Fairbanks Sch of Public Health, Indianapolis, IN; JoAnn E. Manson, Brigham and Women's Hosp, Harvard Medical Sch, Boston, MA; Hongmei Nan, Indiana Univ Fairbanks Sch of Public Health, Indianapolis, IN; Aladdin H. Shadyab, Sch of Med, Univ of California, San Diego, La Jolla, CA; Jennifer W. Bea, Univ of Arizona Cancer Ctr, Coll of Med., Tucson, AZ; Ting-Yuan David Cheng, Coll of Public Health and Health Professions, Univ of Florida, Gainesville, FL; Lifang Hou, Feinberg Sch of Med, Northwestern Univ., Chicago, IL; Yiqing Song, Indiana Univ Fairbanks Sch of Public Health, Indianapolis, IN**

**Introduction** Despite evidence of racial disparities in independent relationships of 25-hydroxyvitamin D (25[OH]D) and parathyroid hormone (PTH) status with cardiovascular risk, little is known about their joint associations with intermediate cardiovascular biomarkers. **Hypothesis** We hypothesized that there are White-Black differences in the direction and shape of the associations of total 25(OH)D and PTH with cardiovascular biomarkers of insulin resistance, beta cell function, systemic inflammation, and renal function among postmenopausal women.**Methods** A random subcohort of 2,800 American White (n=1,500) and Black (n=1,300) postmenopausal women without cardiovascular disease (CVD) at baseline was selected from the Women’s Health Initiative Observational Study (N=93,676). We assessed plasma total 25(OH)D, PTH, high-sensitive C-reactive protein (hs-CRP), as well as creatinine-based glomerular filtration rate (GFR). Fasting glucose and insulin were measured to derive the homeostasis model assessment of insulin resistance (HOMA-IR) and beta cell function (HOMA-B). Weighted linear regression analyses were performed to assess independent and joint associations after
adjusting for age, race/ethnicity, clinical center, education, body mass index, season of blood draw, smoking status, physical activity, alcohol consumption, postmenopausal hormone therapy use, and family history of CVD. Results Total 25(OH)D levels were inversely associated with HOMA-IR among White women only (5.6% decrease per 1 SD increase in 25(OH)D; P for linear trend = 0.001). This association persisted among White women with PTH ≤65 pg/mL (5.9% decrease per 1 SD increase in 25(OH)D; P for linear trend = 0.001). While there was a linear trend towards higher 25(OH)D levels associated with lower GFR levels among White women with PTH ≤65 pg/mL (P for linear trend = 0.045), we found a non-linear relationship between total 25(OH)D and GFR among Black women with PTH >65 pg/mL (P for non-linearity = 0.001). Conclusions Higher levels of total 25(OH)D, independently and jointly with PTH, were associated with lower HOMA-IR in White postmenopausal women. The shapes of the associations between total 25(OH)D and GFR markedly differed between White and Black women after accounting for PTH, suggesting potential racial disparities in vitamin D/PTH mechanisms underlying cardiovascular health.


Funding: No

Funding Component:

P038

Liver Enzyme Levels Are Associated With Metabolic Syndrome and Predict All-Cause and Cardiovascular Mortality in a High-Risk Population: The Strong Heart Family Study

Ying Zhang, Tauqueer Ali, Elisa T Lee, Wenyu Wang, Julie A Stoner, Univ of Oklahoma Health Sciences Ctr, Oklahoma City, OK; Jean W MacCluer, Texas Biomedical Res Inst, San Antonio, TX; Lyle G Best, Missouri Breaks Industries Res, Inc., Eagle Butte, SD; Barbara V Howard, Jason G Umans, Medstar Health Res Inst, Hyattsville, MD; Richard B Devereux, Weill Cornell Medical Coll, New York, NY; Shelley A Cole, Texas Biomedical Res Inst, San Antonio, TX

Introduction: Non-alcoholic fatty liver disease has been associated with an increased risk of cardiovascular disease (CVD). Levels of the circulating hepatic enzymes aspartate amino transferase (AST) and alanine amino transferase (ALT) are used as non-invasive biomarkers of liver fat and fibrosis. A number of studies have investigated the potential for these biomarkers of liver function, as well as their ratio AST/ALT, to predict CVD risk, with equivocal results. We hypothesized that these measurements might be important biomarkers of CVD in American Indians (AI) who experience high rates of both liver disease and type 2 diabetes-related CVD.

Methods: The Strong Heart Family Study (SHFS) is a population-based family study of heart disease and its risk factors in AI. Participants (n=2760) were recruited from 12 tribes located within 3 geographical regions in Arizona, North/South Dakota, and Oklahoma. Circulating biomarkers and metabolic measures were assessed during a clinic visit in 2001-2003. Participants were followed for morbidity and mortality events until the end of 2016. Median follow-up time was 14.5 years.

Results: In this study, 59.8% were female, mean (+ standard deviation) age was 40.8 ±17.2 years, mean BMI was 31.3 ± 7.5 kg/m², 19% had type 2 diabetes (T2D), 32.6% were hypertensive, and 36.1% were current smokers. In univariate analyses, higher ALT and AST levels (IU/L) were associated with all components of the metabolic syndrome (MS), i.e., increased waist circumference, triglycerides, blood pressure, fasting glucose, and decreased HDL-C; all p<0.01. Among diabetes-free participants, those with MS (n=790, as defined by NCEP ATP III criteria) had higher ALT (37.0 ± 7.5 IU/L vs. 29.4 ± 6 IU/L, p<0.01) and AST (28.5 ± 0.5 IU/L vs. 24.5 ± 0.5 IU/L, p<0.01) than those who were free of MS (n=1419). In a Cox
proportional-hazards model, ALT, AST and the AST/ALT ratio were significantly associated with all-cause mortality (n= 439 deaths), when controlling for age, sex, smoking status, hypertension and T2D. Hazards ratios (95% confidence interval) associated with ALT, AST, and ALT/AST ratio were 1.02 (1.01, 1.03), 1.03 (1.02, 1.04), and 1.2 (1.1, 1.3) respectively. In a separate model, AST and AST/ALT ratio were significantly associated with CVD mortality (n=120), and respective hazard ratios were 1.03 (1.01, 1.05) and 1.2 (1.01, 1.43). Parallel trends for associations between these liver biomarkers and incident CVD events (n=272) were not statistically significant though the hazard ratio related to AST/ALT ratio was 1.12 (0.97, 1.3).

Conclusions: In American Indians of the SHFS, liver function biomarkers are significantly associated with metabolic syndrome and its components, and predict all-cause and cardiovascular mortality, suggesting that common mechanisms impact MS-related CVD risk factors and liver disease biomarker levels in this high-risk population.


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Funding Component:

P039

Change in Blood Pressure and Glucose Are Major Determinants of Increasing Carotid IMT in Young Adults

Zhiqian Gao, Lawrance Dolan, Thomas Kimball, Elaine Urbina, Cincinnati Children’s Hosp Medical Ctr, Cincinnati, OH

Increased carotid intima-media thickness (cIMT) is associated with CV events in adults and thicker cIMT is found in youth with CV risk factors including obesity. Which risk factors have the most direct effect upon cIMT in youth and whether obesity has direct or indirect effects is not known. We used structural equation modeling to elucidate direct and indirect pathways through which obesity and other risk factors were associated with increase in cIMT. Demographics, anthropometrics, laboratory and carotid ultrasound data were collected on 426 participants aged 17.5 at baseline (32% type 2 diabetes) and after 5 years of follow-up. Latent change score variables were defined by baseline and follow-up measurements. Latent baseline and follow-up cIMT, glucose variables were defined for each cIMT segment (common, bulb and internal), HbA1c, and fasting glucose. SAS 9.4 CALIS procedure was used for analyses with maximal likelihood estimation. Comparative fit index (CFI >0.9) and root mean squared error of approximation (RMSEA <0.1) were considered good model fit. At follow up, there were increases in BMI, MAP, LDL, TG, HDL, CRP and fasting glucose, decrease in fasting insulin and HbA1c (all p<0.05). There was no increase in common, but significant increase in bulb (0.031 mm) and internal (0.027 mm) cIMT (all p<0.001). Significant direct effects on changes of cIMT were baseline MAP (β 0.23) and BMI z-score (β 0.16) plus change in glucose (β 0.37) and age (β 0.37; all p<0.05). Change in MAP showed a trend in the model (β 0.14, p=0.10). BMI also had significant indirect effect (β 0.17) while non-HDL demonstrated no significant effect. We conclude that baseline adiposity drives increasing BP and glucose in high risk youth leading to accelerated accumulation of carotid atherosclerosis. Prevention of acquisition of obesity is critical in slowing development of CV disease. NIH R01 HL105591 (Urbina) and UL1 TR001425.
Body Mass Index, Sedentary Lifestyle, and Incidence of Coronary Heart Disease

Xiang Li, Tao Zhou, Dianjianyi Sun, Yoriko Heianza, Lu Qi, Tulane Univ, New Orleans, LA

IMPORTANCE Obesity has been related to sedentary lifestyle, and an increased risk of coronary heart disease (CHD); however, no study has assessed the causal link between obesity, sedentary lifestyle, and CHD.

OBJECTIVE To examine whether BMI is causally associated with sedentary lifestyle, and quantify the mediation effects of sedentary lifestyle in the relation between BMI and CHD.

METHOD Sedentary lifestyle was quantified by hours spent on sedentary behaviors including TV watching, using computer (not at work) and driving. We tested the causality between BMI and sedentary lifestyle by Mendelian randomization (MR) analysis using 77 BMI related single-nucleotide polymorphisms (SNP) as the instrumental variable, among 401,876 white British participants (enrolled from 2006 to 2010) from the UK Biobank. A further mediation analysis was performed to assess the relations between BMI, sedentary lifestyle, and CHD risk among 366,370 participants with 3,816 incident CHD cases (followed up to 2016).

RESULT The MR analysis showed that there was a causal relation between BMI and sedentary lifestyle. One standard deviation increment in BMI causally resulted in 0.38 increase in the sedentary hour (p<0.001), independent of age, sex, physical activity, alcohol intake, smoking, and the socioeconomic status. In addition, our mediation analysis indicated that 7% and 26% of the effect of high BMI on incident CHD risk were mediated by 4-5 hours (p=0.02), and ≥ 6 hours (p<0.001) of sedentary lifestyle, compared with < 2 sedentary hours, respectively.

CONCLUSION Our results indicate that high BMI is causally associated with increased hours of sedentary lifestyle, which mediate a significant proportion of the CHD risk associated with high BMI.
Adipose Inflammation as Assessed by Adipose FDG Uptake is Associated With Aortic Vascular Inflammation in Psoriasis

Harry Choi, Amit Dey, Aditya Goyal, Justin Rodante, Andrew Keel, Milena Aksentijevich, Noor Khalil, Jenis Argueta-Ameya, Aarthi Reddy, Martin Playford, Mark Ahlman, Tiffany Powell-Wiley, Joel Gelfand, Nehal Mehta, NIH, Bethesda, MD

Background: Psoriasis, a chronic inflammatory disease, is associated with accelerated vascular inflammation (VI) by FDG PET/CT and increased cardiometabolic dysfunction, including adipose tissue dysregulation. Both visceral and subcutaneous adipose volume are associated with sub-clinical aortic VI as well as future cardiovascular events, however, the relationship of adipose inflammation (assessed as adipose FDG uptake) with sub-clinical aortic VI has never been characterized in psoriasis.

Methods: 104 consecutive biologic naïve psoriasis patients underwent FDG PET/CT scans to measure VI and adipose FDG uptake, represented as target-to-background ratio (TBR) and standardized uptake value (SUV) respectively. After identification of anatomical location (vertebral level T10), a single 3D-volume region of interest with a fixed volume (4.0 cm³) was placed in the subcutaneous adipose to measure FDG uptake as standardized uptake value (SUV) using a dedicated software (OsiriX MD, Geneva, Switzerland). Results: The cohort was middle-aged, predominantly male, low CV risk by Framingham risk score and mild-moderate psoriasis. Adipose FDG uptake significantly associated with skin disease severity as well as aortic VI even beyond traditional risk factors ($\beta=0.33$, $p=0.001$ and $\beta=0.24$, $p=0.014$ respectively). Additionally, adipose FDG uptake mediated the association between psoriasis skin disease severity and aortic VI accounting for 23% of the total effect (Figure).

Conclusions: Our study demonstrated that adipose inflammation is positively associated with psoriasis severity as well as aortic VI. Moreover, adipose inflammation also mediated the relationship between skin disease severity and aortic VI, suggesting that it may contribute to the potential link between psoriasis and CV disease. However, larger studies are needed to confirm our findings.

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Metabolic Syndrome Prevalence and Risk Factors Among Adult Asian Americans


Metabolic Syndrome (MetS) is a disease entity characterized by a constellation of interconnected physiological, biochemical, clinical, and metabolic factors that directly increase the risk of cardiovascular atherosclerotic diseases, and diabetes mellitus type 2. Limited evidence of MetS found excess risk in Asian Americans. Despite lower body mass index (BMI), Asian Americans have higher MetS rate than Caucasians at every BMI level. Although there is the increasing burden of diabetes, hypertension, and obesity in Asian American populations in the US, no national estimates of MetS prevalence are available. This study used the National Health and Nutrition Examination Survey (NHANES) 2015-2016 data to examine the prevalence of MetS, and identify sociodemographic and lifestyle risk factors among Asian Americans. The analysis sample consist of 281 Asian Americans over the age of 18, including 134 women (47.69%) and 147 men (52.31%). The average age was 44. About one third of the sample (24.20%, 68 out of 281) were obese, with a BMI of 27.5 or higher. Chi-square test was used to examine the bivariate relationship, while logistic regression was used to examine the multivariate relationship between MetS and risk factors. We used the International Diabetes Federation (IDF) criteria to decide MetS. Sociodemographic factors included age, gender, marital status, household income, employment status, nativity status, and years lived in the US. Lifestyle factors included smoking, alcohol use, sleep duration, and recreational physical activity. One third of the sample (31.32%, 88/281) met the IDF criteria of MetS. The rate was lower in those who were under- or normal weight (10.38%, 11/106), and higher in those who were overweight (30.84%, 33/107) or obese (64.71%, 44/68). Furthermore, a higher likelihood of having MetS was associated older age (40 or over versus 18-39), having lived in the US for over 5 years, lower household income, and low recreational physical activity. Age, household income, and physical activity reminded independent and significant predictors in multivariate regression model. To the best of our knowledge, this is the first study one to use a nationally representative sample to examine the MetS prevalence and risk factors among adult Asian Americans, a population that faces increasing cardiovascular burden yet remained understudied. The findings of this study provided critical epidemiological reference data for further investigation. Because only a subsample took part in the physical examination, biomarker data were only available for these participants, hence the limited sample size. The authors intend to conduct analyses with a combined sample from multiple release cycles of NHANES to achieve a larger sample size, and use multiple imputation to increase sample size. We will also conduct subgroup analysis by detailed Asian ethnic groups, BMI level, gender, and age group.


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P043

Twelve-Year Trajectories of Insulin Sensitivity from Oral Glucose Tolerance Tests Are Associated With Incident Dyslipidemia: The Ansan-Ansung Community Cohort Study

Ju-mi Lee, Eulji Coll of Med, Daejeon, Korea, Republic of; Kyoungmin Kim, Soo Lim, Seoul Nat...
Introduction: Insulin resistance and dyslipidemia are often comorbid. Although possible biochemical explanations exist, there are inadequate longitudinal data to support the theory directly. Objectives: This study aimed to test the association between twelve-year trajectories of insulin sensitivity from oral glucose tolerance test (OGTT) and the incidence of dyslipidemia in a community cohort. Secondly, we tested which lipidemia profile is associated with trajectories. Methods: Participants (n=3899; aged 40-69 years, during 1 to 7 visit, mean follow-up 12 years) were recruited from the Ansan-Ansung cohort study, a subset of Korean Genome Epidemiology Study. OGTT were measured at every visit. Matsuda index of each visit was calculated by the formula $10^{4}/((\text{GLU}0\times\text{INS}0\times\text{GLU}60\times\text{INS}60)^{0.5})$. We used total seven times of OGTT (28 OGTT index) for trajectories. Latent mixture modeling was used to identify trajectories in Matsuda index for 12 years. The associations of Matsuda index trajectories with the incidence of dyslipidemia and each component of the lipid profile during 12 years were assessed by logistic regression. Age, body mass index, alcohol drinking, cigarette smoking, c reactive protein, education level, and income were adjusted at the final model. Results: Three distinct insulin sensitivity trajectories were identified: low-stable (Group 1; 88.8%), steady decreasing (Group 2; 9.7%), and fast decreasing (Group 3; 1.5%). Low stable cluster (referent: steady decreasing) was associated with greater incident dyslipidemia in total (OR=1.61, 1.25-2.07), and men (OR=2.03, 1.45-2.86) before and after adjustment (OR=2.03, 1.32-3.12, OR=2.08, 1.35-3.22). The low stable cluster was associated with the greater incidence of triglycerides≥200mg/dl in total (OR=1.61, 1.18-2.19), and men (OR=1.59, 1.06-2.40). Also, the low stable cluster was associated with greater incident HDL<40mg/dl in total (OR=1.35, 1.06-1.71), and men (OR=1.81, 1.30-2.53). However low stable cluster was not associated with LDL and total cholesterol. Conclusions: Longterm low stable insulin sensitivity trajectory had increased associations with future incident dyslipidemia especially TG and HDL component.

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P044

Repeated Measurement of Insulin Sensitivity is Increasing the Precision of Incident Dyslipidemia Prediction Compared to Single Baseline Measurement: The Ansan-Ansung Community Cohort Study

Ju-mi Lee, Eulji Coll of Med, Daejeon, Korea, Republic of; Kyoung Min Kim, Soo Lim, Seoul Nat Uni Bundang Hosp, Seongnam, Korea, Republic of; Hyeon Chang Kim, Yonsei Univ Coll of Med, Seoul, Korea, Republic of

Introduction: Medical data are commonly measured repeatedly. However, there is a lack of studies of the usability of trajectory as a repeated measurement on the prediction model compare to the single measurement. Objectives: This study aimed to evaluate whether repeated measurement of insulin sensitivity can improve the prediction of incident dyslipidemia beyond the single measurement. Methods: Participants (n=3899; aged 40-69 years, during visit 1 to 7, mean follow-up 12 years) were recruited from the Ansan-Ansung cohort study, a subset of Korean Genome Epidemiology Study. Oral glucose tolerance test (OGTT) were measured at every visit with a 2 year interval. Matsuda index of each visit was calculated by the formula $10^{4}/((\text{GLU}0\times\text{INS}0\times\text{GLU}60\times\text{INS}60)^{0.5})$. We used total seven times of OGTT (28 OGTT index) for trajectories. Latent mixture modeling was used to identify trajectories in Matsuda index for 12 years. We used tertiles of baseline Matsuda
index for single measurement. Age, body mass index, alcohol drinking, cigarette smoking, 
c-reactive protein, education level, and income were covariates. We compared two model’s 
discriminatory power using area under the curve of the receiver operating characteristics curve 
(AUROC). **Results:** In the trajectory model (repeated measurement), three distinct insulin 
sensitivity trajectories were identified: low-stable (Group 1; 88.8%), steady decreasing 
(Group 2; 9.7%), and fast decreasing (Group 3; 1.5%). In the baseline single measurement 
model, tertile groups were divided: low-tertile(<6.25, N=130, 33.50%), tertile 2 (6.25-10.89, 
N=1277, 32.75%), and tertile 3(≥10.89, N=1316, 33.75%). Trajectory model showed 
better discrimination power compared to single measurement model in the total population 
(AUROC 0.6303 vs. 0.6234) and men (AUROC 0.6671 vs. 0.6470) but not in women 
(AUROC 0.6171 vs. 0.6176).

**Conclusions:** Repeated measurement of insulin sensitivity can improve the prediction of incident dyslipidemia in the general population.

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**Sun Exposure is Not Associated With Lower Cardiovascular Risk in Mexican Women**

**Mercedes Aguilar,** Mario Flores, Insto Nacional de Salud Pública, Cuernavaca, Mexico; Carlos 
Cantú-Brito, Insto Nacional de Ciencias Médicas y Nutrición "Salvador Zubirán", Mexico City, 
Mexico; Martín Lajous, Ruy López-Ridaura, Insto Nacional de Salud Pública, Cuernavaca, Mexico

**Background:** Sun exposure has been associated with reduced risk of stroke and all-cause 
mortality possibly due to a decreased vascular tone related to vitamin D production. However, 
previous studies have measured sun exposure based on geographical estimations of radiation, 
and have been mostly conducted in latitudes far from the Equator where UV radiation is lower 
than in tropical and subtropical latitudes and where there is little variation in skin tone.

**Hypothesis:** Sun exposure is inversely associated with subclinical cardiovascular disease in Mexican women.

**Methods:** We conducted a cross-sectional analysis in 2,257 disease-free women from the 
Mexican Teachers’ Cohort who were invited to clinical examinations in 4 different Mexican 
states. Participants responded to questions on sun exposure habits at 4 age periods (12-24, 25-35, 36-59, >60). Sun exposure was defined as the weighted average of weekly hours spent 
under the solar noon from age 12 to the age at clinical examination. Carotid intima-media 
thickness (c-IMT) was measured on both carotid arteries through ultrasound by standardized 
neuropathologists and log transformed. We defined carotid atherosclerosis as mean right or left c-
IMT ≥0.8 mm or the presence of plaque. We used linear and logistic regression to evaluate 
the association between quartiles of sun exposure, c-IMT and carotid atherosclerosis, 
with quartile 1 as reference.

**Results:** Mean age of participants was 49.6 (5.5) years and the prevalence of carotid 
atherosclerosis was 12.3% in quartile 1 vs 10.6% in quartile 4. The median weekly hours of 
exposure for each quartile were: 1 (Q1), 1.79 (Q2), 3 (Q3), 4 (Q4). The age-adjusted % mean 
difference in c-IMT comparing women in the first quartile to women in the fourth quartile 
was -1.5% (95% CI -2.9, -0.1). After further adjustment for site, socioeconomic status, 
smoking status, ethnicity and physical activity the % mean difference was no longer significant 
(-0.7%, 95% CI -2.0, 0.7). The age-adjusted OR for carotid atherosclerosis for women in the 
fourth quartile compared to women in the first quartile was 0.81 (95% CI 0.57, 0.95). However, 
in the multivariable model, the OR was non-significant (0.94, 95% CI 0.69, 1.2). Stratified 
analysis for ethnicity and obesity showed no difference between groups.
Conclusion: Sun exposure was associated with neither cIMT nor carotid atherosclerosis in Mexican women. Atherosclerosis might not play a role in the biological mechanism explaining the inverse association between sun exposure and cardiovascular risk.


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Baseline Insulin Sensitivity From Oral Glucose Tolerance Test Are Associated With Incident Dyslipidemia: The Ansan-Ansung Community Cohort Study

Ju-mi Lee, Eulji Coll of Med, Daejeon, Korea, Republic of; Kyoung Min Kim, Soo Lim, Seoul Nat Uni Bundang Hosp, Daejeon, Korea, Republic of

Introduction: Insulin resistance and dyslipidemia are often comorbid. Although possible biochemical explanations exist, there is still too small community based longitudinal data to support the theory directly. Objectives: This study aimed to test the association between the baseline of insulin sensitivity from oral glucose tolerance test (OGTT) and the incidence of dyslipidemia in a community cohort. Secondly, we tested which lipidemia profile is associated with tertiles of Matsuda index. Methods: Participants (n=3899; aged 40-69 years, during visit1 to 7, mean follow-up for 12 years) were recruited from the Ansan-Ansung cohort study, a subset of Korean Genome Epidemiology Study. OGTT were measured at baseline examination. Baseline Matsuda index was calculated by the formula $10^4/((\text{GLU0xINS0} \times \text{GLU60xINS60})^{0.5})$. We then used tertiles of Matsuda index. The associations of Matsuda index tertiles with the incidence of dyslipidemia and each component of the lipid profile during 12 years were assessed by logistic regression. Age, body mass index, alcohol drinking, cigarette smoking, c reactive protein, education level, and income were adjusted at the final model. Results: Tertile groups were divided: low tertile(<6.25, N=1306, 33.50%), tertile 2 (6.25-10.89, N=1277, 32.75%), and tertile 3(≥10.89, N=1316, 33.75%). Low tertile (referent: tertile 2) was associated with greater incident dyslipidemia in total before (OR=1.39, 1.13-1.72) and after adjustment (OR=1.26, 1.02-1.57). Low tertile was associated with greater incident triglycerides≥200mg/dl in total (OR=1.33, 1.10-1.62), women (OR=1.35, 1.01-1.81) and men (OR=1.34, 1.03-1.74) before and adjustment. However low tertile was not associated with other dyslipidemia profiles such as HDL, LDL, and total cholesterol. Conclusions: Low tertile of insulin sensitivity at baseline had increased associations with future incidence of dyslipidemia especially with triglycerides component.

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P047

Circulating Testosterone and Sex Hormone-Binding Globulin Concentrations and Risk of Type 2 Diabetes, Cardiovascular Disease, and All-Cause Mortality in US Women

Jun Li, Harvard T.H. Chan Sch of Public Health, Boston, MA; Jie Hu, Tianyi Huang, Brigham and Women’s Hosp, Boston, MA; Susan E. Hankinson, Univ of Massachusetts Amherst, Amherst, MA; Frank B. Hu, Harvard T.H. Chan Sch of Public Health, Boston, MA; JoAnn E. Manson, Kathryn M. Rexrode, Brigham and Women’s Hosp, Boston, MA; Shelley S. Tworoger, Harvard T.H. Chan Sch of Public Health, Boston, MA
**Introduction** It remains unclear whether circulating testosterone and sex hormone-binding globulin (SHBG) are associated with cardiometabolic disease risk and mortality.

**Hypothesis** Higher SHBG and lower testosterone levels are associated with reduced risk of incident type 2 diabetes (T2D), cardiovascular disease (CVD), and all-cause mortality in women.

**Methods** Baseline testosterone and SHBG measures were available on 11,314 women from the Nurses' Health Study I and II, who were part of 9 separate nested case-control studies and were free of CVD, T2D, and cancer at study baseline. Total testosterone was assayed by a radioimmunoassay or liquid chromatography tandem mass spectrometry; SHBG was measured by an immunoassay. Free testosterone was calculated based on a standard clinical formula. Hazard ratios (HRs) and 95% confidence intervals (CIs) were estimated using Cox regressions, adjusted for study design characteristics, established risk factors and confounders including menopausal statues, hormone therapy, and continuous body mass index.

**Results** During up to 22 years of follow-up (215,120 person-years), 891 incident T2D cases, 1,089 CVD cases (fatal myocardial infarction, nonfatal coronary heart disease, and fatal/nonfatal stroke), and 1,818 deaths occurred. In multivariable analyses, circulating SHBG levels were inversely associated with incident T2D (comparing the highest to lowest quartiles, HR [95% CI]: 0.34 [0.24-0.47]; P<0.001) and all-cause mortality (HR: 0.78 [0.65-0.95]; P=0.03). Total testosterone was inversely associated with T2D (HR: 0.71 [0.53-0.96]; P=0.04), while free testosterone was positively associated with T2D (HR: 1.99 [1.44-2.75]; P<0.001) and all-cause mortality (HR: 1.22 [1.00-1.48]; P=0.02). No association was observed between SHBG, nor free or total testosterone and CVD.

**Conclusions** Lower circulating levels of SHBG and higher levels of free testosterone were associated with increased risk of T2D and all-cause mortality, but not CVD, in women.


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P048

**Early Cardiometabolic Risk: The Prevalence of Compensatory Hyperinsulinemia in U.S. Populations**

David P Cistola, Liliana Bonilla, Erin B Campbell, Paul L. Foster Sch of Med, El Paso, TX

**Introduction:** Metabolic syndrome (MetS) and prediabetes (PreD) identify individuals at increased cardiometabolic risk. However, by the time those conditions develop, a significant decline in beta-cell insulin secretion has already occurred. The earliest stage in the pathogenesis of type 2 diabetes includes compensatory hyperinsulinemia, the robust response of intact beta cells to peripheral insulin resistance. This state of early metabolic dysregulation is not detected by conventional glucose and lipid screening.
Hypothesis: The U.S. prevalence of compensatory hyperinsulinemia is high.

Methods: Population-weighted data from the 2013-2014 cohort of the U.S. National Health and Nutrition Examination Survey (NHANES) were analyzed. The inclusion criteria were ages 12 and up, and the exclusion criteria were type 2 diabetes (fasting glucose ≥ 125 mg/dL, HbA1c ≥ 6.5 or 2-Hr glucose from OGTT ≥ 200 mg/dL), fasting triglycerides ≥ 885 mg/dL (familial hypertriglyceridemia), pregnancy or missing lab values. After population weighting, the 2,128 subjects sampled represented 198,424,653 non-diabetic individuals, approximately 62% of the U.S. population.

Results: The subjects were categorized into four groups: NN: no MetS or PreD, no hyperinsulinemia; NY: no MetS or PreD with hyperinsulinemia; YN: MetS and/or PreD, no hyperinsulinemia; and YY: MetS and/or PreD with hyperinsulinemia. Hyperinsulinemia was defined as fasting insulin ≥ 12.2 μIU/ml based on prior calibration against the euglycemic clamp. The NY group represented compensatory hyperinsulinemia (CH). The 2013-2014 prevalence of CH was 11.2% of the non-diabetic U.S. population (95% CI: 11.17, 11.18). This group represented ~20% of the total at-risk subjects, defined as the sum of the NY, YN and YY groups. The prevalence of CH was highest in the youngest age groups and declined with age: 21.1% (21.08, 21.12) for ages 12-19, 13.2% (13.22,13.24) for ages 20-39, 7.7% (7.74, 7.75) for ages 40-59, 6.4% (6.34, 6.36) for ages 60-79, and 2.6% (2.63, 2.66) for ages 80 and up. The CH prevalence was higher in females vs. males: 12.7% (12.72, 12.73) vs. 9.6% (9.60, 9.61). In addition, CH prevalence was highest among Mexican Americans (17.0%; 16.98, 17.01) and other Hispanics (18.2%; 18.22, 18.27), followed by non-Hispanic blacks (12.3%; 12.29, 12.31), Native American/mixed race/other (10.8%; 10.79, 18.84), non-Hispanic whites (9.8%; 9.79, 9.80) and Asians (6.3%; 6.26, 6.29).

Conclusion: The prevalence of compensatory hyperinsulinemia is high, especially in adolescents and young adults. These findings highlight a target population for early screening and intervention strategies to improve diabetes prevention outcomes.

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P049

Circulating Adiponectin Levels and Risk of Type 2 Diabetes, Cardiovascular Disease, and All-Cause Mortality in US Women

Jie Hu, Brigham and Women’s Hosp, Boston, MA; Jun Li, Liming Liang, Harvard T.H. Chan Sch of Public Health, Boston, MA; Tianyi Huang, Brigham and Women’s Hosp, Boston, MA; Frank B. Hu, Harvard T.H. Chan Sch of Public Health, Boston, MA; JoAnn E. Manson, Brigham and Women’s Hosp, Boston, MA; Shelley S. Tworoger, Moffitt Cancer Ctr and Res Inst, Tampa, FL; Kathryn M. Rexrode, Brigham and Women’s Hosp, Boston, MA

Introduction Adiponectin is an anti-inflammatory peptide hormone secreted by adipocytes and has been related with decreased risk of type 2 diabetes (T2D) and cardiovascular disease (CVD), but longitudinal data are limited and inconsistent.

Hypothesis Higher circulating adiponectin levels are associated with lower risk of T2D, CVD, and all-cause mortality in healthy women.

Methods Baseline adiponectin levels, measured by an immunoassay, were available on 15,131 women from the Nurses’ Health study I and II, who were part of 11 separate nested case-control studies and free of T2D, CVD, and cancer at study baseline. Associations of adiponectin levels with incident T2D, CVD, and all-cause mortality were estimated using Cox regressions adjusted for study design characters, established risk factors and confounders including menopausal status,
hormone therapy, and continuous body mass index. We also analyzed associations of 26 adiponectin expression-associated variants (in adipose tissue) with T2D, CVD, and all-cause mortality in the UK Biobank study.

**Results** During up to 22 years (289,408 person-years) of follow-up, 2,578 T2D cases, 1,827 CVD cases (including 745 CHD, 1,108 stroke and 428 CVD deaths), and 2,741 deaths occurred. In multivariable models, hazard ratios (95% confidence intervals) comparing the highest quartile of plasma adiponectin to the lowest were 0.17 (0.14-0.21; $P_{\text{trend}}<0.001$) for T2D, 0.82 (0.69-0.96; $P_{\text{trend}}=0.005$) for CVD, 0.66 (0.51-0.86; $P_{\text{trend}}<0.001$) for CHD, 0.91 (0.73-1.12; $P_{\text{trend}}=0.34$) for stroke, 0.69 (0.48-0.98; $P_{\text{trend}}=0.10$) for CVD death, and 0.77 (0.66-0.90; $P_{\text{trend}}=0.005$) for all-cause mortality. Genetic alleles associated with increased adiponectin expression in adipose tissue were associated with decreased risk of CVD, but no associations were observed for T2D and all-cause mortality.

**Conclusions** Higher adiponectin levels are associated with decreased risk of cardiometabolic diseases and all-cause mortality.

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**P050**

**Competing Health Priorities Lead Young Women to Worry Little About Heart Disease**

**Holly C Gooding,** Div of Adolescent/Young Adult Med, Boston Children’s Hosp; Dept of Pediatrics, Harvard Medical Sch, Boston, MA; **Courtney A Brown,** Div of Adolescent/Young Adult Med, Boston Children’s Hosp, Boston, MA; **Anna C Revette,** Survey and Data Management Core, Div of Population Sciences, Dana-Farber Cancer Inst, Boston, MA; **Jingyi Liu,** Dept of Pediatrics, Harvard Medical Sch, Boston, MA; **Catherine Stamoulis,** Div of Adolescent/Young Adult Med, Boston Children’s Hosp; Dept of Pediatrics, Harvard Medical Sch, Boston, MA; **Sarah D de Ferranti,** Dept of Cardiology, Boston Children’s Hosp; Dept of Pediatrics, Harvard Medical Sch, Boston, MA

**Introduction:** The American Heart Association (AHA) Go Red for Women campaign has substantially improved heart disease awareness among adult women. Little is known about how younger women in adolescence and young adulthood (AYA) perceive their risk of heart disease during this key time in the life course for primordial prevention.

**Methods:** We used an explanatory sequential mixed method design consisting of the AHA National Women’s Health Study survey and follow-up focus groups. We surveyed a random convenience sample of 331 AYA women ages 15-24 years presenting for care at an urban academic medical center and a community health center. Survey results guided development of a qualitative guide used during eight online, semi-structured focus groups with 32 young women. We report descriptive statistics performed using Matlab (Mathworks, Inc.) and thematic analyses conducted to synthesize data from the online focus groups using NVivo 11.

**Results:** Only 10% [n=33] of AYA identified heart disease as the leading cause of death in women. Very few identified it as the top health concern for women of all ages [16 (4.8%)] or
women in their age group [3 (0.9%)]. Most young women surveyed worried little [131 (39.6%)] or not at all [123 (37.2%)] about getting heart disease. In contrast, mood disorders were the most commonly noted top health concern for women of all ages [66 (19.9%)] and women in their age group [59 (17.8%)] and many AYA [142 (42.9%)] worried a lot about getting depression or anxiety. AYA discussed age (“I feel like those are things I associate with older people like 40”), competing health priorities (“because we’re so pressured just to grow up and more focused on pregnancies or depression or our weight”), and lack of perceived risk (“I like to think that I’m conscious of what I eat and drink”) as personal reasons for not worrying about heart disease. At the end of the focus group discussions, AYA women expressed being more motivated to both learn about heart health and to perform heart healthy behaviors (“I am definitely more motivated because I wasn’t aware that it was the number one killer so I will definitely make sure to start working out”). Many group participants also noted the importance of receiving heart health information as well as personalized risk information from doctors.

**Conclusions:** Younger women are unaware that heart disease is the leading cause of death in women and express little worry about their future risk. As the antecedents of heart disease begin in childhood and adolescence, these findings demonstrate a major unmet need. Campaigns to promote heart healthy behaviors in young women should directly address low perceived risk, the importance of lifetime risk, and competing health priorities with both young women and their health care providers.

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as a context for their current lifestyles. The influencing factors, both facilitators and barriers, are categorized as environmental, relational, financial, work/life/school balance, and internal/intrinsic motivation. Participants described their conceptualizations of an ideal healthy lifestyle modification program and the necessary components for success. The benefits and results of a healthy lifestyle were clearly described as feeling better and experiencing improved physical tolerance, looking better, reaping the rewards of experiencing results, positive feedback from others, and social acceptance and validation. Conclusions. Understanding high-risk college students’ beliefs and perceptions regarding CVD risk factors, barriers, facilitators, and strategies for implementing a healthy lifestyle, is the first step to assessing the problem facilitating early intervention which may result in improved long-term cardiovascular health outcomes in the young population.

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Not Only Velocity but Also Variability in Body Mass Index in Childhood Are Associated With HOMA-IR at Adulthood: 30 Years Follow-up Kangwha

Su Jin Lee, Jung Hyun Lee, Hyeon Chang Kim, Il Suh, Yonsei Univ Coll of Med, Seoul, Korea, Republic of

Introduction Recent studies have reported that childhood obesity increased the risk of adult metabolic disorders. Moreover, the variability and rapid increase in body mass index (BMI) during childhood have been revealed as risk factors for adult obesity. Although obesity increases metabolic disorders through induction of insulin resistance, it has not been studied whether the rate of change and variability of BMI during childhood are independently associated with insulin resistance at adulthood. Hypothesis We assessed the hypothesis that rate of change and variability of BMI during childhood would affect insulin resistance at adulthood. Method The study cohort consisted of 284 Kangwha study participants (aged 25 - 38 years at follow-up) who had been screened at least four times during childhood (aged 6 - 19 years) and also had no diabetes at adulthood. The average follow-up period was 21.5 years. BMI Z-score was measured by considering the growth curve in Korea, and rate of change (velocity) in BMI during childhood for each individual was assessed by mixed models; BMI residual standard deviation (RSD) during childhood was calculated as a measure of variability. Outcome variable was homeostatic model assessment of insulin resistance (HOMA-IR) at adulthood follow-up. Results The mean age of the participants 13.3 (SD 1.4) years and mean BMI was 18.6 (SD 2.3) at childhood. One SD increase in rate of change in BMI z-score ($\beta = 0.32$, $p$-value <0.001) and in RSD of BMI ($\beta = 0.31$, $p$-value <0.001) during childhood were positively and independently associated with HOMA-IR. Stratified by sex, adult HOMA-IR was also positively associated with the velocity ($\beta = 0.36$, $p = 0.001$ in men, and $\beta = 0.38$, $p = 0.001$ in women) and variability ($\beta = 0.25$, $p = 0.03$ in men; $\beta = 0.27$, $p = 0.002$ in women) of BMI during childhood. Conclusions BMI velocity and variability during childhood appear to be independent risk factors for adult HOMA-IR. Our findings suggest prevention of rapid weight gain and body weight regulation during childhood would be important factors to reduce insulin resistance at adulthood related with metabolic disorders.

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The Frequency of High Glycemic Load Meals is Predictive of Cardiovascular Risk Factors in Children at Risk for Obesity After 2 Years

Karine Suissa, Andrea Benedetti, McGill Univ, Montreal, QC, Canada; Mélanie Henderson, Ctr Hospier Univire Sainte-Justine, Montreal, QC, Canada; Katherine Gray-Donald, Gilles Paradis, McGill Univ, Montreal, QC, Canada

Introduction: Consuming a daily diet of high glycemic load (GL) carbohydrates has potential long-term effects on obesity and cardiovascular health. However, it is possible that the GL of certain meals (breakfast, lunch and supper) have different effects. Few studies have examined the effect of meal-specific GL and frequency of high GL meals on adiposity and cardiovascular health in children. We hypothesized that the number of high GL meals per day, and secondarily, the meal-specific GL, would predict cardiovascular risk factors in children after two years of follow-up.

Methods: We used data from the QUALITY cohort which recruited 630 children, ages 8-10 years at baseline with at least one obese parent. Three separate 24-hour dietary recalls were administered by a dietitian at baseline and individual meal-specific GL scores were calculated using the International table of GI. CV risk factors measured at 2 years of follow-up included continuous values of BMI z-score, percent fat mass, triglycerides, LDL and HDL cholesterol, and systolic (SBP) and diastolic (DBP) blood pressure obtained through direct measurement (blood pressure, blood lipids, anthropometrics) or questionnaires (socio-economic characteristics). Linear regressions between meal-specific GL categorized as high (≥33) vs. low (<33) and CV risk factors were estimated, adjusting for important confounders, including underreporting, as well as anthropometric, socio-economic and dietary factors. Secondary analysis consisted of linear regression with number of high GL meals as an ordinal exposure variable.

Results: Mean age at baseline was 9.6 years, with 33% of children overweight or obese. Breakfast, lunch and supper glycemic load were positively associated with each other. A higher number of high GL meals was positively associated with BMI z-score (β=0.18, 95%CI: 0.06, 0.30), percent fat mass (β=1.74, 95%CI: 0.52, 2.96) and triglycerides (β=0.08, 95%CI: 0.03, 0.14) and negatively associated with HDL (β=-0.04, 95%CI: -0.07, -0.01). Our secondary analysis revealed that High breakfast GL was positively associated with increased triglycerides (β=0.14, 95%CI: 0.05, 0.23) after 2 years but not adiposity, HDL, LDL and blood pressure. High GL lunch (β=0.27, 95%CI: 0.08, 0.46) and supper (β=0.22, 95%CI: 0.02, 0.41) were associated with higher BMI z-score after 2 years.

Conclusion: In conclusion, consuming more than one high GL meal per day is associated with greater BMI and unhealthy lipid profile after 2 years.


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Associations Between Lifestyle Behaviors and Body Composition in 9-11 Year Old New Zealand Children: The Moderating Effect of Parental Resilience

Lee Stoner, Univ of North Carolina, Chapel Hill, NC; Rebecca Harding, Jillian Hszard, Kim Meredith-Jones, Pouya Saedi, Paula Skidmore, Univ of Otago, Dunedin, New Zealand

Introduction: Obesity prevalence continues to rise for all age groups, particularly in those experiencing adversity or hardship. However, not all those experiencing adversity are obese. Previous research has focused on whether
resilience in adults is associated with a healthy body composition, through increased ability to make healthier lifestyle choices. However, there is no research on how parental resilience relates to the lifestyle choices and body composition of their children. **Hypothesis:** Higher parental resilience is associated with better lifestyle (moderate to vigorous physical activity (MVPA), sedentary time, sleep duration, fruit & vegetable consumption) choices and healthier body composition. **Methods:** This cross-sectional study recruited 408 children (9.7 [SD:0.69] y, 50% F) and their primary caregiver (41 [SD: 5.5] y, 84% F) from Otago, New Zealand. Three dependent variables were calculated: body mass index z-score (zBMI) using WHO criteria, fat mass index (FMI, kg/m²) using bio-impedance analysis (BIA), and central adiposity (waist circumference, WC, cm). The four independent variables were: time (hours) spent asleep, sedentary or in MVPA using accelerometry, and fruit and vegetable dietary pattern derived from a food frequency questionnaire. Parental resilience was measured using the 10 item Conner-Davidson questionnaire. Associations between children’s lifestyle behaviours and body composition were examined using mixed effects regression models, with school as a random effect. Models were adjusted for child age, sex, ethnicity, level of deprivation, and parent age and sex. To explore the moderation effects of resiliency an interaction term was included, where resilience was split into low and high resilience by the median. **Results:** For the fully adjusted models, MVPA was not significantly associated with zBMI (p=0.760), FMI (p=0.984) or WC (p=0.785), nor were these relationships moderated by resiliency. Sedentary time was not associated with zBMI (p=0.447), FMI (p=0.210) or WC (p=0.380). However, resiliency moderated the association between sedentary time and WC (p=0.048), with a negative association for low resiliency (β=-0.2, 95%CI: -1.1, 0.7), and positive association for high resiliency (β=-1.2, 95%CI: -0.1, 2.5). Sleep duration was negatively associated with zBMI (β=-0.1, 95%CI: -0.31, -0.0), FMI (β=-0.3, 95%CI: -0.6, -0.1) and WC (β=-1.1, 95%CI: =2.0, -1.6); resiliency did not moderate these relationships. Higher fruit and vegetable consumption was not associated with zBMI, but was positively associated with FMI (β=0.2, 95%CI: 0.1, 0.3) and WC (β=0.9, 95%CI: 0.5, 1.4); resiliency was not a significant moderator of these relationships. **Conclusions:** Parental resilience moderated the relationship between sedentary time and WC, with a positive relationship between sedentary time and WC for the high resiliency group.

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**Evaluating the Impact of the New Pediatric Clinical Practice Guideline on the Prevalence of Pediatric Hypertension and Associations With Adult Hypertension: The International Childhood Cardiovascular Cohort (i3C) Consortium**

**Michael Khoury,** Phil Khoury, Cincinnati Children's Hosp Medical Ctr, Cincinnati, OH; Tian Hu, Rachel Widome, Univ of Minnesota, Minneapolis, MN; Lydia Bazzano Bazzano, Tulane Univ Sch of Public Health and Tropical Med, New Orleans, LA; Trudy L. Burns, Dept of Epidemiology, Coll of Public Health, Univ of Iowa, Iowa City, IA; Stephen R. Daniels, Univ of Colorado Sch of Med, Aurora, CO; Terry Dwyer, Oxford Martin Sch, Oxford Univ, Oxford, United Kingdom; Johanna Ikonen, Markus Juonala, Univ of Turku, Turku, Finland; Mika Kähönen, Univ of Tampere and Tampere Univ Hosp, Tampere, Finland; Ronald J Prineas, Wake Forest Univ Sch of Med, Winston-Salem, NC; Olli Raitakari, Univ of Turku, Turku, Finland; Alan Sinaiko, Julia Steinberger, Univ of Minnesota, Minneapolis, MN; Alison Venn, Univ of Tasmania, Tasmania, Australia; Jorma Viikari,
Background: New pediatric hypertension (HTN) definitions were recently introduced in a clinical practice guideline (CPG). We evaluated the impact of the CPG (compared to the previous guideline, the “Fourth Report”) on the prevalence of pediatric HTN and associations with HTN in adulthood.

Methods: Data from the International Childhood Cardiovascular Cohort (i3C), a consortium comprising seven large, long-standing study cohorts from the United States, Finland, and Australia, were used. The mean of 2-6 BP measurements using an auscultatory technique were obtained. BP was categorized as normal, elevated, and hypertensive (stage 1 and 2) using the Fourth Report and CPG. For those with multiple BP assessments within an age category, a random assessment was selected for analysis. Childhood participants were contacted in adulthood and data on self-reported HTN was recorded.

Results: There were 34,014 youth (mean age 10.4 ± 3.1 years, 49.4% male) with 92,751 BP assessments available for analysis. Use of the CPG increased hypertension prevalence from 7.6% to 13.5% (stage 1) and 1.3% to 2.5% (stage 2, p <0.0001). Among those 6 to <9 years, 805/880 (91.5%) re-classified from elevated BP to stage 1 HTN (Table). The greatest reclassification from stage 1 to 2 HTN occurred among those aged 15 to <18 years (294/597, 31.3%). The greatest reclassification to a lower BP category occurred among youth measured at age 13 to <15 years. Of 9,591 adults (mean age 48.8 +/- 7.9 years, range 21.0 - 64.6 years), 2,913 (30.4%) had self-reported HTN. The sensitivity for predicting adult HTN among those with HTN at any point in childhood was 13.4% and 22.4% (specificity 92.3% and 85.9%), as defined by the Fourth Report and CPG, respectively.

Conclusion: The CPG resulted in a significantly increased prevalence of HTN in children and adolescents due to significant re-classification to higher BP categories. While the observed increases were not consistent across age groups, the results suggest increased sensitivity regarding the development of HTN in adulthood.

Table: Reclassification of hypertension categories using the 2017 Clinical Practice Guideline (CPG)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Normal by Fourth Report</th>
<th>Normal by CPG</th>
<th>Elevated by Fourth Report</th>
<th>Elevated by CPG</th>
<th>Stage 1 HTN by Fourth Report</th>
<th>Stage 1 HTN by CPG</th>
<th>Stage 2 HTN by Fourth Report</th>
<th>Stage 2 HTN by CPG</th>
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</thead>
<tbody>
<tr>
<td>6-9</td>
<td>13,349 (98.9%)</td>
<td>1,942 (95.7%)</td>
<td>8 (5.0%)</td>
<td>70 (5.0%)</td>
<td>667 (91.8%)</td>
<td>657 (93.0%)</td>
<td>2 (0.3%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>9-13</td>
<td>13,368 (91.2%)</td>
<td>1,396 (95.7%)</td>
<td>3 (2.0%)</td>
<td>643 (50.2%)</td>
<td>586 (89.9%)</td>
<td>576 (85.9%)</td>
<td>1 (0.2%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>13-&lt;15</td>
<td>2,254 (100%)</td>
<td>0 (0.0%)</td>
<td>2 (0.0%)</td>
<td>1,299 (93.3%)</td>
<td>442 (62.5%)</td>
<td>432 (60.0%)</td>
<td>112 (16.3%)</td>
<td>56 (8.1%)</td>
</tr>
<tr>
<td>15-&lt;18</td>
<td>8,022 (100%)</td>
<td>0 (0.0%)</td>
<td>13 (1.6%)</td>
<td>2,162 (97.1%)</td>
<td>1,098 (77.6%)</td>
<td>998 (69.9%)</td>
<td>48 (3.5%)</td>
<td>23 (1.7%)</td>
</tr>
</tbody>
</table>


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P056

Adolescent Self-Reported School Environment and Obesity Prevalence, the Fragile Families and Child Wellbeing Study

Zerleen S Quader, Shakira F Suglia, Emory Univ, Atlanta, GA

Introduction

Childhood obesity continues be a major public health concern in the United States, and disproportionately affects racial/ethnic minorities and children of lower socioeconomic status. Social environments such as schools are particularly influential in shaping child and
adolescent health, and represent an important target for interventions to improve health behaviors. Positive school environments, those that are safe, supportive, respectful, and engaging, have been shown to be associated with adolescent health behaviors; however, few studies have examined whether a positive school climate can influence physical health, such as obesity status.

**Hypothesis**

We hypothesized that adolescents’ self-reported positive school environment would be associated with a lower prevalence of obesity in a disadvantaged population and that this association may differ by sex.

**Methods**

Data were from the sixth wave of the Fragile Families and Child Wellbeing Study, a cohort of children born between 1998 and 2000, approximately two-thirds of whom were born to unmarried parents. Adolescents were, on average, 15 years of age at the time of the assessment and had height and weight measured during a home visit. Positive school environment was operationalized using adolescent self-reported responses to survey questions examining school connectedness, school climate (teacher quality and student behavior towards teachers), and presence of bullying behaviors in the past month. A cumulative school environment score was created, ranging from zero to five, with a score of four or five defined as a positive school environment (i.e. high levels of connectedness, positive climate, and no bullying). The final analytic sample size was 1,044 adolescents. Log binomial regression was used to estimate prevalence ratios for obesity.

**Results**

Twenty-six percent of the sample was obese, and 45% reported a positive school environment. Crude and adjusted models were similar. After adjustment for race/ethnicity, parent marital status at first wave, and student receipt of free lunch, there did not appear to be an association between positive school environment and prevalence of obesity among boys (PR: 1.1; (0.8, 1.4)). Among girls, there was a slight inverse association between positive school environment and prevalence of obesity (PR: 0.8; (0.6, 1.1)), however this was not statistically significant.

**Conclusions**

Results suggest that a more positive school environment could be associated with a lower prevalence of obesity among adolescent girls in a high-risk population. However, because of the cross-sectional nature of this analysis, results should be interpreted with caution, as temporality cannot be established. Future work should explore the use of validated measures of school environment to improve measurement and explore whether interactions exist between school environment and adolescents’ sex.

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**P057**

**Lipid Evaluation in a Large Cardiology Practice**

**S Kristen Sexson Tejtel**, Constance Cephus, Texas Childrens Hosp, Houston, TX

Background - Elevated lipids are becoming an increasing problem in children particularly with increasing rate of obesity. We undertook an evaluation to determine if the risk factors are similar for children in a pediatric cardiology practice who are evaluated for lipids is similar to those for children without congenital heart disease. Methods -We performed a medical record review from January 2006- January 2018 of all children in a pediatric cardiology practice who had lipids obtained. We evaluated their weight, height, BMI, blood pressure and the lipid results. A descriptive analysis was performed to determine the rate of risk factors for hyperlipidemia in this population. Results - In total, 12,950 children had 38,158 lipid panels obtained. The average age at the time the lipid
The total cholesterol level, the HDL level was less than 40 in 32% (or 10,654 labs) and less than 35 in 20% (or 6,508 labs). Subfractionation of the HDL was rarely performed.

Conclusions - We are identifying a large population of patients with elevated cholesterol and low HDL cholesterol. The risk factors however may be different as there is a lower proportion of these patients who are overweight or obese than in a typical population. Further evaluation for other risk factors in the population of children with congenital heart disease is necessary.

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Cardiometabolic Risk Factors From a School-Based Cross-Sectional Screening Program

Lee A Pyles, Christa Lilly, Amy Joseph, Charles Mosimah, Eloise Elliott, William A Neal, Charles Mullett, West Virginia Univ, Morgantown, WV

Introduction: Coronary Artery Risk Detection in Appalachian Communities is a school-based cross-sectional screening program to detect significant cardiometabolic disease risk factors (CMRFs) in WV children. Fifth graders have undergone school screening for family history, anthropometrics and lipid panel values since 1999 including screening for Acanthosis Nigricans (AN Pos or Neg). Our hypothesis is that presence of AN can predict need to screen for CMRFs. Methods: Parental consent and child assent were obtained before screening day using an IRB-approved protocol. Height and weight were used to calculate BMI and BMI%ile. Systolic blood pressure over 95%ile, triglyceride over 150 mg/dl, HDL under 40 mg/dl and BMI over 95%ile were tabulated and correlated. Glucose and HOMA IR were only checked for AN Pos subjects and thus not considered in analysis.

Results: 102,930 5th graders participated in CARDIAC up to 2017. 101,101 had BMI determination, 100,000 blood pressures, 67,710 lipid panels were checked. 27.9% of children (28715) were obese, defined as BMI over 95%ile and 18.4% (18,931 subjects) were overweight. 10.8% of AN pos children vs. 1.9% of all children exhibited 4 CMRFs (Obese BMI, Htn, high TG, low HDL, OR 7.31, 95% CL 6.4-8.35). Conclusion: AN correlated to CMRF clustering but many CMRF pos subjects were AN Neg (79.5% or 1236/1555 of those with 4 CMRFs). Multifactoral screening of lipids, BMI, blood pressure are indicated to identify risk for cardiovascular disease.


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P059

18-Day Lifestyle Interventions Benefits the Kidney
Francisco E Ramirez, Neil Nedley, Nedley Clinic, Colfax, CA; Rebecca Michel, Mark Quion, Leslie Ciceron-Medor, Weimar Inst, Colfax, CA

Introduction Chronic kidney disease is a prevalent and expensive pathology defined by the gradual loss of kidney function. BUN/Creatinine gives an indirect measure of the kidneys function. The most common cause of kidney problems is poorly controlled diabetes. We explored the effect that lifestyle changes has on kidney function.

Methods Data taken from a medical residential lifestyle program from dates 1987 to 1999 was used. N=553 with abnormal BUN/creatinine laboratories were used for the study most of them with a diagnosis of diabetes and/or hypertension. The 18 day medical residential program took place in Weimar, California. A holistic approach was adopted to cater a specific schedule for each participant. It offered the assistance of an professional team along with a consistent lifestyle intervention. The program included the following components: medical consultations by a board certified physician, health educational training, massage, hydrotherapy, plant-based cooking classes, 2 vegan meals a day, exercise coaching with emphasis on outdoor activities, and spiritual care. Every patient received a baseline and end of the program blood and urine tests. Results From the participants n=553, 65.3% were females. At baseline the BUN/creatinine level average was 12.39 with a ST DEV of 3.74. At the end of the program the average BUN creatinine was 10.50 with a ST DEV of 3.33. The before and after BUN/Creatinine change was significant with p<0.001 paired t-test (t(552)=12.35. At the end of the program n=372 (66.2%) participants’ BUN creatinine levels had improved, n=140 (24.9%) worsened, and n=41 (7.29%) remained unchanged. Conclusion The 18 day intervention was able to improve kidney function in more than half of the participants. The increased blood flow could due to the increase in exercise and decrease in protein, specially elimination of animal protein. A long term follow should be done to see if the change remains.

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Sedentary Behavior is Directly Associated With Higher Prevalence of Chronic Kidney Disease in Older Adults: The Framingham Heart Study

Joowon Lee, Vanessa Xanthakis, Ramachandran S Vasan, Boston Univ Sch of Med, Boston, MA

Introduction Self-reported physical inactivity and sitting time have been associated with a greater prevalence of chronic kidney disease (CKD) in middle-aged populations. However, data are limited regarding the association of objectively-assessed physical activity and sedentary behavior with prevalence of CKD among older adults. Hypothesis We hypothesized that higher physical activity and less sedentary time will individually and conjointly be associated with a lower prevalence of CKD in older adults. Methods We evaluated 1,318 Framingham Offspring cohort participants (mean age 69.3 years, 53.9% women) with accelerometry-derived physical activity data (wear time ≥ 10 hours/day for at least 4 days) at examination 9 (2011-2014). CKD was defined as an eGFR < 60 ml/min/1.73² and/or urine albumin-to-creatinine ratio (UACR) ≥ 25/35 micrograms/mg (men/women) at examination 9. Multivariable logistic regression models were used to relate physical activity and sedentary time with the prevalence of CKD adjusting for covariates (Table). In sensitivity analysis to mitigate reverse causality, we excluded participants with more advanced CKD (eGFR<30 ml/min/1.73²). Results Men spent
more time in moderate to vigorous physical activity (MVPA) (mean 21.7 min/day) and less time in sedentary time (mean, 660.7±76.9 min/day), compared to women (mean MVPA, 15.6 min/day; mean sedentary time, 675.8±70.5 min/day). Overall, 279 participants had prevalent CKD (20.8%; 127 women). Higher sedentary time was associated with a higher prevalence of CKD after adjusting for risk factors and MVPA in sensitivity analysis, the association remained significant. MVPA was inversely associated with CKD prevalence in minimally-adjusted models only. **Conclusions**

Our cross-sectional observations on a sample of older adults are consistent with the notion that reduction of sedentary time in the elderly may have salutary effects on kidney function. Additional studies of multiethnic cohorts are warranted to confirm our observations.

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**P061**

**Incidence of Major Cardiovascular Disease and Subsequent Risk of End-stage Renal Disease: the Atherosclerosis Risk in Communities (ARIC) Study**

**Junichi Ishigami,** Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Logan Cowan, Georgia Southern Univ, Statesboro, GA; Ryan Demmer, Pamela Lutsey, Univ of Minnesota, Minnesota, MN; Morgan Grams, Josef Coresh, Kunihiro Matsushita, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD

**Background:** Cardiorenal syndrome is a well-known concept. However, in contrast to extensive investigations of chronic kidney disease (CKD) as a risk factor of cardiovascular disease (CVD), whether CVD increases long-term risk of end-stage renal disease (ESRD) is much less studied. **Methods:** In 8,881 participants of the Atherosclerosis Risk in Communities Study who attended visit 4 (1996-1998), we assessed the association of incident hospitalization with major CVD (heart failure, atrial fibrillation, coronary heart disease, and stroke) with subsequent risk of ESRD. Hospitalization with CVD was entered into multivariable Cox models as a time-varying exposure to estimate hazard ratios (HRs) and 95% confidence intervals (CI). **Results:** Baseline mean age was 62 years, 59% were female, 22% were black, and 5.5% had eGFR 15-60 ml/min/1.73m². During a median follow-up of 15.9 years, there were 141 cases of ESRD. In multivariable Cox analysis, each incident CVD subtype was independently associated with increased risk of ESRD, with the highest HR for heart failure (HR, 16.9 [95%CI, 11.6-24.7]), followed by coronary heart disease, atrial fibrillation, and stroke (Model 2 in Table). The association remained significant across CVD subtypes except for atrial fibrillation, when all CVD subtypes were simultaneously entered into a Cox model as time-varying exposures (Model 3 in Table). The results were similar when modeling death as a competing risk, and consistent across subgroups of age, sex, race, diabetes, and CKD. When analyzing confirmed events of heart failure with preserved ejection fraction (HFrEF) (n=205) and reduced ejection fraction (HFrEF) (n=190), the association was particularly evident for HFrEF (10.8 [5.9-19.7]) compared to HFrEF (4.9 [2.0-11.7]).

**Conclusions:** These findings support CVD as a potent risk factor of ESRD. Patients with CVD, particularly heart failure, should be recognized as a high risk population for ESRD. Distinct contribution of HFrEF vs. HFrEF to ESRD deserves future investigations.
The Benefits of Preemptive Transplant Vary by Cause of End-stage Renal Disease

Alvin Thomas, UNC Chapel Hill, Chapel Hill, NC; Courtenay Holscher, Christine Haugen, Kyle Jackson, Allan Massie, Dorry Segev, Macey Henderson, Fawaz Al Ammary, Daniel Brennan, Jacqueline Garonzik Wang, Johns Hopkins Univ, Baltimore, MD

Introduction: Cardiovascular events, i.e. cardiac arrest and arrhythmia, are the leading cause of death among patients with end-stage renal disease (ESRD). Kidney transplantation (KT) reduces mortality and is the preferred treatment for ESRD. Generally, preemptive KT, especially with a living donor, reduces mortality over KT after dialysis initiation. Mortality reduction by preemptive KT may vary by cause of ESRD.

Hypothesis: Decreased all-cause mortality after preemptive KT varies by cause of ESRD.

Methods: We studied 56,927 adult living donor KT recipients from 2000 to 2017 using the Scientific Registry of Transplant Recipients. We compared all-cause mortality in preemptive living donor KT recipients to those who underwent living donor KT within a year of starting dialysis, stratifying by cause of ESRD. We estimated the adjusted hazard ratio (aHR) of mortality comparing KT with <1 year on dialysis to preemptive KT recipients accounting for recipient and transplant factors using inverse probability weights.

Results: Compared to recipients on <1 year of dialysis, preemptive KT recipients were more often female, older, college educated, employed, and had higher BMI (all p<0.001). The association between preemptive KT and post-KT mortality did vary by cause of ESRD (Figure 1). For example, among recipients with ESRD caused by type I diabetes, <1 year on dialysis was associated with a higher hazard of mortality (aHR: 1.32 (1.17-1.50), p<0.001). However, among recipients with ESRD caused by hypertension (p=0.1) or type II diabetes (p=0.3), there was not a statistically significantly difference in mortality comparing KT with <1 year on dialysis vs. preemptive KT.

Conclusions: Our findings suggest that for particular ESRD patients, like those with type I diabetes, early counseling regarding preemptive KT and finding a living donor are imperative. Future studies should assess whether expedited review of potential living donors for these patients reduces mortality in this population at high risk of cardiovascular events.
Funding Component:

P063

Serum Calcification Propensity and Cardiovascular Disease Events Among Patients With Chronic Kidney Disease: the CRIC Study

Joshua D Bundy, Xuan Cai, Rupal Mehta, Northwestern Univ, Chicago, IL; Julia J Scialla, Duke Univ, Durham, NC; Geoffrey A Block, Colorado Kidney Care, Denver, CO; Harold I Feldman, Univ of Pennsylvania, Philadelphia, PA; Ian H de Boer, Univ of Washington, Seattle, WA; James P Lash, Univ of Illinois at Chicago, Chicago, IL; Jing Chen, Tulane Univ, New Orleans, LA; Chi-yuan Hsu, Univ of California San Francisco, San Francisco, CA; Mirela A Dobre, Case Western Reserve Univ, Cleveland, OH; Mary B Leonard, Stanford Univ, Palo Alto, CA; Panduranga S Rao, Univ of Michigan, Ann Arbor, MI; Alan S Go, Kaiser Permanente Northern California, Oakland, CA; Raymond R Townsend, Univ of Pennsylvania, Philadelphia, PA; Edward R Smith, The Royal Melbourne Hosp, Melbourne, Australia; Andreas Pasch, Calciscon AG, Biel-Nidau, Switzerland; Tamara Isakova, Northwestern Univ, Chicago, IL

Introduction: Patients with chronic kidney disease (CKD) are at high risk for cardiovascular disease (CVD) events and vascular calcification is one pathway by which risk is increased.

Hypothesis: We assessed the hypothesis that a novel measure of serum calcification propensity is associated with CVD events among patients with CKD stages 2-4.

Methods: Among 3397 participants from the prospective longitudinal Chronic Renal Insufficiency Cohort (CRIC) Study, calcification propensity was quantified at baseline as the transformation time (T50) from primary to secondary calciprotein particles, with lower T50 corresponding to higher calcification propensity. CVD events are reported every six months and confirmed by medical record adjudication. Multivariable-adjusted Cox proportional hazards regression models, stratified by study site, were used to assess the associations of T50 with risks of atherosclerotic CVD events (myocardial infarction, stroke, and peripheral artery disease) and congestive heart failure (CHF) events.

Results: Over an average 7.1-year follow-up, we observed 571 atherosclerotic CVD events (312 myocardial infarction, 120 stroke, and 139 peripheral artery disease events) and 633 CHF events. The mean (standard deviation) T50 was 313.4 (79.1) minutes. After adjustment for traditional CVD risk factors, lower T50 was significantly associated with higher risk of atherosclerotic CVD, but not with risk of CHF. The addition of T50 modestly improved atherosclerotic CVD event discrimination beyond ACC/AHA atherosclerotic CVD risk score variables (c-statistic 0.713 vs. 0.710; p<0.001). Adjustment for kidney function attenuated the association between T50 and CVD events (Table).

Conclusions: Among patients with CKD stages 2-4, higher serum calcification propensity is significantly associated with atherosclerotic CVD events, but not with CHF events. Future studies should evaluate whether T50 and its determinants represent novel therapeutic targets.

Background: Chronic kidney disease (CKD) is estimated to affect 14% of adults in the US, and there is a continued need to identify actionable risk factors for impaired kidney function. Viral infections, including hepatitis C, have been demonstrated to cause secondary glomerular nephropathies, such as cryoglobulinemia. However, there has been conflicting evidence of causal associations between hepatitis C infection (HCV) and incident CKD. Furthermore, this relationship has not been well-studied in individuals of Hispanic or Latino descent.

Hypothesis: We hypothesized that hepatitis C infection would be positively associated with incident CKD among Hispanics/Latinos.

Methods: The study population was comprised of 11,120 participants of the Hispanic Community Health Study/Study of Latinos (HCHS/SOL), a cohort of adults sampled from four regions across the US. The cohort was 63% female, and mean age at baseline (2008-2011) was 47 years. HCV seropositivity was defined by detectable HCV antibodies and confirmation with either recombinant immunoblot assay (RIBA) testing or detectable HCV RNA. Individuals were determined to have CKD if they had estimated glomerular filtration rate <60 mL/min/1.73 m² and albumin/creatinine ratio >30mg/g. Those with prevalent CKD at baseline were excluded from the analysis. Logistic regressions were performed to estimate the odds ratios (OR) and 95% confident intervals [95% CI] of CKD at Visit 2 (2015-2017). Estimates were adjusted for demographic factors including age, gender, and self-reported heritage/background. Adjustments were also made for baseline educational attainment, smoking behaviors, body mass index, prevalent diabetes, and prevalent hypertension.

Results: Over a median follow-up of 5.9 years, 202 cases of CKD occurred. Incident CKD was proportionally, more common among HCV infected individuals: 8 of 116 (6.9%) HCV seropositives experienced CKD, in contrast to 194 cases (1.8%) among the 11,004 non-infected individuals. The crude odds ratio of CKD among HCV infected participants was more than 4 times that of uninfected participants (OR 4.51 [1.97-10.34]). After adjustment for demographic factors, such as age and self-reported heritage, HCV infection continued to be associated with increased risk (OR 2.45 [1.02-5.89]). However, after further controlling for comorbid conditions, the odds ratio of CKD among HCV seropositives was attenuated and no longer significant (OR 2.25 [0.87-5.84]). Diabetes (OR 4.91 [2.73-8.83]) and hypertension (OR 2.22 [1.32-3.74]) were significantly associated with incident CKD.

Conclusion: Among individuals of Hispanic/Latino origin, hepatitis C infection does not appear to be associated with increased risks of CKD. These results imply that primary and secondary prevention of diabetes and hypertension may hold higher priority than treatment HCV infection in efforts to prevent CKD among Hispanics/Latinos.
Disclosures:  **E. Wong:** None.  **A.C. Ricardo:** None.  **N. Franceschini:** None.  **J.P. Lash:** None.

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Funding Component:

**P066**

**A Meta-Analysis of Protective Effect of Allopurinol in Preventing Contrast Induced Nephropathy in Patients Undergoing Percutaneous Coronary Intervention**

**Kanaan Mansoor,** Ahmad Amro, Mehier El-Hamdani, Iheanyichukwu Ogu, Marshall Univ, Huntington, WV

Background: Contrast-induced nephropathy (CIN) is an adverse outcome of both diagnostic and therapeutic cardiac catheterization procedures. It has been associated with prolonged hospitalization, morbidity and mortality. Aim of this study was to understand the protective effect on Allopurinol on CIN. Methods: Search for the literature was done of Science Direct, Pubmed/Medline, and Cochrane library. A total of 385 papers were reviewed according to the PRISMA protocol by two investigators, out of which 5 manuscripts were included in this study. Manuscripts which studied effect of allopurinol on CIN in patient undergoing PCI were included in the meta-analysis. In all studies CIN was diagnosed if there was >25% elevation in serum creatinine. Results: A total of 5 studies met the inclusion criteria. Risk difference was calculated for each study and was tabulated in a forest plot. Heterogeneity was 83.81% with P < 0.001 hence a random effect model was used. Overall Risk difference was -0.140 (CI 95% -0.257, -0.022). Conclusion: Our study demonstrates that Allopurinol potentially has a protective in preventing contrast induced nephropathy in patients undergoing percutaneous coronary intervention. Further large clinical trails are warranted to better understand this effect.

Disclosures:  **K. Mansoor:** None.  **A. Amro:** None.  **M. El-Hamdani:** None.  **I. Ogu:** None.

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Funding Component:

**P067**

**A Co-Design Approach to Validate a Text Message Bank for Use With Older Adults at Risk of Cardiovascular Disease**

**Jessica C Ardo,** Jung-Ah Lee, Janet Hildebrand, Diana Guijarro, Univ of California, Irvine, Irvine, CA; Hassan G Ghasemzadeh, Washington State Univ, Pullman, WA; Lorraine S Evangelista, Univ of California, Irvine, Irvine, CA

**Purpose/Aims:** To describe the design and validation of a text message bank that will be used for an mHealth behavioral change intervention -- Fitness Intensive Therapy (Get FIT+) in order to improve healthy eating and enhance physical activity in a sample of older adults (≥ 60 years) at risk for cardiovascular disease.

**Background:** Short message service (SMS) has been widely used in patient follow-up and disease management, showing improvements in medication adherence, symptom monitoring, appointment attendance and satisfaction with health services. However, most studies usually focus on the effectiveness of SMS and lack information regarding the development and validation of their content to guarantee adequate understanding and appeal of SMS strategies by end users.

**Methods:** An initial bank of 68 SMS text messages was developed to focus on healthy eating, physical activity and provide motivational feedback through an extant
literature review for promoting behavior change to engage in healthy lifestyles. The messages were organized into three subsets [e.g., healthy eating (24 messages), physical activity (24 messages), other goals and compliance (20 messages)] for field validation. An expert panel (N = 5) evaluated each subset of SMS text messages. Consistent with the Get FIT+ project that will utilize the text messages, additional validation was conducted with 5 older adults (≥ 60 years old) from diverse ethnic backgrounds representative of the population in Orange County. Two to three people evaluated each of the three SMS text message subsets (N = 5, 40% male). User demographics, phone literacy, understanding and appeal of each SMS text message was assessed using a 27-item questionnaire.

Results: The text message content included educational, motivational and goal progress feedback on the topics of nutrition, physical activity and compliance/other goals. Overall, the three SMS datasets received a total of 10 evaluations each. All evaluations—10 out of 10 (100%) valid responses—revealed an adequate understanding of the key idea contained in the SMS text message. The older adults’ average appeal score of the three datasets was 9.0 (SD±0.2) of 10 points. Participants did not make significant suggestions to change the wording of the messages, but provided excellent and useful feedback to optimize the messaging.

Implications: The final set of SMS text messages produced had very high rates of understanding and appeal among an expert panel and older adults who represented the potential recipient. This study highlights the importance of developing and validating a database of simple, feedback-oriented SMS text messages, grounded in evidence and theory, with an expert panel and active engagement of potential end users.


Funding: No
comorbidities (taste: 19.2%; smell: 21.1%), and prediabetic/diabetic patients with comorbidities (taste: 22.8%; smell: 28.0%) had higher prevalence of diminished capacity in taste and smell. After adjustment for confounders in our models, significant associations remained between taste and smell impairment and prediabetes/diabetes with comorbidities (taste: OR 1.79, 95% CI (1.31, 2.45); smell: OR 1.52, 95% CI (1.17, 1.97)), but not without comorbidities versus healthy people (taste: OR 1.15, 95% CI (0.85, 1.54); smell: OR 1.10, 95% CI (0.89, 1.37)), and were not modified by age, sex, and race. Furthermore, we conducted sensitivity analyses for individual comorbidities and found that cardiovascular disease and neuropathy were consistently associated with reduced ability in both taste and smell. In conclusion, our results from national data indicate that taste and smell alterations may be possible predictors of the presence and progression of prediabetes/diabetes.

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Funding Component:

P069

Longitudinal Associations Between Metabolic Status, Insulin Clearance, and Insulin Sensitivity: The Prospective Metabolism and Islet Cell Evaluation (PROMISE) Cohort

Zhila Semnani-Azad, Ravi Retnakaran, Univ of Toronto, Toronto, ON, Canada; Stewart B. Harris, Western Univ, London, ON, Canada; Bernard Zinman, Anthony J. Hanley, Univ of Toronto, Toronto, ON, Canada

Metabolically healthy obese individuals (MHO) are those with obesity but normal metabolic profiles. The relationship of MHO to type 2 diabetes mellitus (T2DM) risk is unclear. Limited data are available on metabolic status and declining insulin clearance (IC) and insulin sensitivity (IS), which are well-documented features in the pathogenesis of T2DM. Objective: To assess longitudinal changes in IC and IS among metabolically healthy and unhealthy obese and non-obese participants. Hypothesis: Longitudinal declines in IC and IS will be greater among participants classified as metabolically unhealthy and/or obese compared to metabolically healthy non-obese (MHN). Methods: Adults ≥30 years old at-risk for T2DM in PROMISE had three assessments over 6 years (n=558). Obesity was classified as BMI ≥30 kg/m². Baseline metabolic parameters, including blood pressure, TAG, HDL, fasting glucose, waist circumference, and medication use, were used to determine metabolic status. Metabolically healthy status was defined as the presence of <3 metabolic abnormalities. Values from oral glucose tolerance tests at each visit were used to calculate Matsuda insulin sensitivity index (ISI), and the ratios of fasting C-peptide-to-insulin (ICfasting) and areas-under-the-curve of C-peptide-to-insulin (ICauc). Generalized estimating equations (GEE) evaluated the association of baseline metabolic status with longitudinal changes in IC and IS, adjusting for covariates. Results: The multivariate GEE model showed that MHO and MUO had greater declines in IC and IS over time compared to MHN (Figure, both p<0.01). Metabolically unhealthy non-obese (MUN) had a longitudinal decline in ICfasting but not ICauc compared to MHN, and a more modest relative decline in IS. Conclusions: Compared to MHN, presence of a metabolically unhealthy and/or obese phenotype negatively impacted IC and IS over time. The more pronounced declines in IC in MUO and MHO may reflect a compensatory response to the poorer IS in these groups.
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Funding Component:

**P070**

**Hemoglobin A1c Trajectories and Two-year Mortality in Individuals With Diabetes After Cardiac Catheterization**

Sridharan Raghavan, Wenhui G. Liu, Anna E. Baron, Mary E. Plomondon, Michael Ho, Liron Caplan, Rocky Mountain VA Medical Ctr, Aurora, CO; Thomas M. Maddox, Washington Univ in St. Louis, St. Louis, MO

**Background:** Guidelines advise relaxing glycemic control goals in diabetes patients with coronary artery disease (CAD). However, the hemoglobin A1c (HbA1c) trajectories that occur in routine clinical care in diabetes patients with objectively assessed CAD have not been described, and their association with mortality is unknown. **Methods:** We studied 7780 individuals with diabetes using data from the Veterans Affairs Clinical Assessment, Reporting, and Tracking Program, a registry of US Veterans who have undergone coronary angiography since 2005. We used HbA1c values from the measurement closest in time preceding catheterization and all values during two years of follow-up to fit longitudinal latent class models. We determined optimal trajectory model fit by Bayes Information Criteria, varying the functional form of time and the numbers of HbA1c trajectory classes. We then fit a joint latent class longitudinal mixed model to estimate associations between HbA1c trajectory class and two-year mortality, adjusting for clinical and demographic covariates, including an interaction term between HbA1c trajectory and CAD burden (no, non-obstructive, or obstructive), and with an autoregressive correlation structure for repeated HbA1c measurements. **Results:** Three trajectory classes best fit the data: individuals with stable glycemia after catheterization (class 1; 89%, 6934 of 7780), those with a decline in HbA1c after catheterization (class 2; 4.7%, 364 of 7780), and those with an increase in HbA1c after catheterization (class 3; 6.2%, 482 of 7780). Class 1 participants were older, more likely to be white, less likely to have congestive heart failure, and more likely to be adherent to cardioprotective medications. In multivariable joint mixed models, two-year mortality was 4.3% in class 1, 4.7% in class 2, and 5.0% in class 3 and differed significantly across HbA1c trajectory classes (p=0.047). In pairwise comparisons, two-year mortality differed significantly between individuals in classes 1 and 3 (p=0.03), but not between those in classes 1 and 2 (p=0.9) or between those in classes 2 and 3 (p=0.5). The interaction between trajectory class and CAD burden was non-significant (p=0.1), but limited by the number of participants with no or non-obstructive CAD. In individuals with obstructive CAD, we observed a significant association between HbA1c trajectory and mortality (p=0.04), driven by a difference between classes 1 and 3 (p=0.04) as in the full cohort. **Conclusions:** Distinct HbA1c trajectories were evident within 6 months after cardiac catheterization in patients with diabetes and were associated with two-year mortality. Serial HbA1c measurements in outpatient follow-up after cardiac catheterization could classify individuals with diabetes based on HbA1c trajectory; these trajectories may inform mortality risk stratification, especially in those with obstructive CAD.

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Funding: Yes

Funding Component: National Center
Elevated Liver Enzymes Are Associated With Incident Diabetes in Hispanic/Latino Adults: Results From HCHS/SOL

Simin Hua, Qibin Qi, Albert Einstein Coll of Med, Bronx, NY; Christina M Parrinello, Flatiron Health, Redding, CT; Jorge R Kizer, San Francisco Veterans Affairs Health Care System, San Francisco, CA; Howard Strickler, Albert Einstein Coll of Med, Bronx, NY; Bharat Thyagarajan, Univ of Minnesota Medical Ctr, Fairview, MN; Martha Daviiglus, Univ of Illinois at Chicago, Chicago, IL; Gregory A Talavera, Univ of Minnesota Medical Ctr, Fairview, MN; Robert Kaplan, Carmen R Isasi, Albert Einstein Coll of Med, Bronx, NY

Introduction: Non-alcoholic fatty liver disease (NAFLD) as measured by ultrasonography or elevated liver enzymes, such as alanine aminotransferase (ALT), aspartate aminotransferase (AST) and gamma-glutamyl transpeptidase (GGT), has been associated with increased risk of incident diabetes. But such evidence is lacking in the Hispanic/Latino population, which has high prevalence of obesity and NAFLD.

Methods: We conducted a prospective cohort study of 6928 adults of Hispanic/Latino background who had no diabetes at baseline (2008-2011). Incident diabetes was defined by self-reported diagnosis of diabetes, glucose measurements or antidiabetic medication use at repeat visits on average 6 years from baseline. We examined the associations of baseline liver enzymes (sex-specific quartiles of ALT, AST, GGT) with incident diabetes using survey-weighted Poisson regression with follow-up time as an offset. Results: The weighted mean age was 38 years at baseline. A total of 793 adults developed diabetes during 6 years of follow-up. After adjusting for demographics and socioeconomic status, versus the lowest quartile, highest quartiles of ALT, AST and GGT were significantly associated with 1.5 to 3.5-fold increased risk of incident diabetes. Further adjusting for behavioral variables including diet and exercise, cardiovascular risk factors and cardiovascular medication use, the associations were attenuated and remained statistically significant for ALT (RR quartile 4 vs 1: 1.42[95% CI 1.07-1.90], P-trend=0.001) and GGT (RR quartile 4 vs 1: 1.97[1.34-2.88], P-trend<0.001) but not AST (RR quartile 4 vs 1: 1.28[0.96-1.70], P-trend=0.02). Adjusting for HOMA-IR further attenuated the associations, and GGT but not ALT remained significantly associated with incident diabetes. Conclusion: Elevated ALT and GGT levels are associated with increased risk of developing diabetes among Hispanics/Latinos. Additional work is needed to understand the relationship between NAFLD and diabetes risk in this population.

Table. Associations of liver enzymes with incident diabetes

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<th>RR (95% CI) for quartile 2 vs 1</th>
<th>RR (95% CI) for quartile 3 vs 1</th>
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<td>GGT</td>
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<td>1.74 (1.15, 2.62)</td>
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Funding: No

Funding Component: P073
A Novel Epigenetic Link Between Gestational Diabetes Mellitus and Macrosomia

Brian Joyce, Northwestern Univ, Chicago, IL; Huikun Liu, Tianjin Women’s and Children’s Health Ctr, Tia, China; Leishen Wang, Tianjin Women’s and Children’s Health Ctr, Tianjin, China; Jun Wang, Yinan Zheng, Drew Nannini, Northwestern Univ, Chicago, IL; Alex Drong, Stephanie Shiau, Columbia Univ, New York, NY; Weiqin Li, Junhong Leng, Tianjin Women’s and Children’s Health Ctr, Tianjin, China; Yun Shen, Ru Gao, Gang Hu, Pennington Biomedical Res Ctr, Baton Rouge, LA; Andrea Baccarelli, Columbia Univ, New York, NY; Lifang Hou, Northwestern Univ, Chicago, IL

Background: Gestational diabetes mellitus (GDM) is a known risk factor for macrosomia, with recent estimates suggesting that between 15-45% of newborns of mothers with GDM are macrosomic (vs. 12% in non-GDM mothers). This study’s objectives were to explore associations between both maternal GDM and children’s macrosomia and DNA methylation of eight genes selected based on a literature review of candidates potentially involved in GDM and obesogenic pathways (IGF1, IGF2, H19, ARHGRF11, MEST, NR3C1, Adiponectin, and RETN).

Methods: Data were taken from the Tianjin GDM Observational study, in the 4th-largest city in China; subjects were ages 24-49 and diagnosed with GDM between 2005-2009. Baseline surveys were completed from 2009-2011 for 580 enrolled women-child pairs; an additional 580 women-child pairs without GDM and frequency matched on child sex and birth date were enrolled. We examined 572 GDM cases vs. 573 non-GDM controls; of these 177 children were born with macrosomia (114 to women with GDM, p<0.001). Anthropometric measurements of all enrolled women were completed as part of usual prenatal care; blood draws for DNA methylation analysis (using the Illumina 850K array) were collected from children (median age 5.9 years, range 3.1-10.0). We used logistic regression for all analyses and adjusted for maternal height, age, smoking status, pre-pregnancy overweight/obesity, weight gain during pregnancy, parity, and hypertensive disorders of pregnancy as well as child sex and gestational age at delivery. FDR adjustment was used to correct all candidate gene CpG analyses for multiple testing, with FDR-adjusted P<0.05 considered statistically significant.

Results: After analysis of 345 CpGs in eight target genes, one CpG was associated with macrosomia (cg14428359) and one with GDM (cg19466922) at FDR < 0.05; both CpGs were located in the gene MEST (3′ and 5′ untranslated regions, respectively). One additional CpG site in the promoter region of MEST (cg05862114) was associated with both GDM and macrosomia before FDR adjustment. All three CpGs were hypomethylated in both children of GDM mothers and macrosomia cases.

Conclusions: MEST is a paternally imprinted gene that is highly expressed in fetal and placental tissue, and believed to play an important role in fetal development. It has also been found to have elevated expression in adipose tissue; epigenetic regulation of MEST may play an important role in the link between GDM and macrosomia.


Funding: Yes

Funding Component:

P074

Epidemiology of Diabetes Phenotypes and Association with Cardiovascular Risk in the National Health and Nutrition Examination Survey (NHANES)
Introduction: A recent study among Scandinavian adults identified novel unique diabetes phenotypes using data on traditional diabetes characteristics. Our objective was to assess whether unique diabetes phenotypes are present in a multi-ethnic US sample and, if so, are differentially associated with cardiovascular disease (CVD) risk factors. Methods: We included 4300 NHANES participants (age ≥20 years) from exams 2003-04 to 2013-14 identified as having diabetes by any of the following: self-report of previous diabetes diagnosis, self-report of diabetes medication use, fasting glucose ≥126 mg/dL (≥8 hours fasting), random glucose ≥200 mg/dl, and glycated hemoglobin (HbA1c) ≥6.5%. We used an iterative data-driven method (k-means clustering) to partition the sex-stratified sample into unique groups based on data for each of the following: self-reported age of diabetes diagnosis, body mass index (BMI), waist circumference, HbA1c, and years of insulin use. We estimated the association between diabetes subgroup with traditional CVD risk factors, accounting for demographics and NHANES sampling methods. Results: We identified four unique subgroups of diabetes phenotypes related to age (AR), insulin use (IU), severe obesity (SOR), and severe hyperglycemia (SHG). Of the 4300 diabetes cases, 51.3% were AR, 5.9% were IU, 30.3% were SOR, and 12.5% were SHG (Table). We observed differences in subgroup prevalence by race/ethnicity. Compared to the AR phenotype, all groups had higher HbA1c and BMI, the IU and SOR groups had greater blood pressure and cholesterol medication use, and the IU group had worse profiles for renal, eye, and neuropathy complications. Conclusion: Our findings corroborate that diabetes is a heterogeneous disease with unique subgroups and, a novel aspect of our work, differentially distributed across race/ethnicity. Our findings challenge whether diabetes prevention and treatment strategies should be reconsidered to phenotype-specific in order to reduce diabetes incidence, morbidity, and mortality.

Disclosures: M. Bancks: None. R. Casanova: None. E. Gregg: None. A. Bertoni: None.

Funding: No

Funding Component:

P076

Regression of Prediabetes and Diabetes is Associated with Mild Weight and Waist Loss - ELSA-Brasil

Scheine Canhada, UFRGS, Porto Alegre RS, Brazil; Bruce B Duncan, UFRGS, Porto Alegre, Brazil; Vivian C Luft, UFRGS, Porto Alegre RS, Brazil; Isabela M Bensenor, USP, Sào Paulo, Brazil; Sandhi M Barreto, UFMG, Belo Horizonte, Brazil; Maria I Schmidt, UFRGS, Porto Alegre RS, Brazil

Introduction: The prevalence of diabetes has risen dramatically in the last decades. Prediabetes, or intermediate hyperglycemia,
represents an early stage of diabetes development. Structured diabetes prevention programs can lead to regression of prediabetes, but observational studies may reflect better a real-world scenario for public health planning. Hypothesis: We assessed the hypothesis that regression of prediabetes to normoglycemia (and from newly diagnosed diabetes to prediabetes) is associated with weight loss and with decrease in waist circumference in a well-characterized, nonintervention contemporary cohort, ELSA-Brasil. Methods: We enrolled 15105 civil servants (34-75 years) in 6 capital cities in Brazil from 2008-10 and followed those without previously known diabetes for an average of 3.7 years. We performed a standardized oral glucose tolerance test and measured fasting and 2h plasma glucose as well as HbA1c in a central laboratory. Diabetes and prediabetes were defined using American Diabetes Association criteria at each visit. We measured weight and waist circumference with standardized protocols and obtained sample characteristics by questionnaire. Those with abnormal glycemia were instructed to seek medical attention. Results: Of the 6301 participants with prediabetes at baseline not receiving anti-diabetic medication at either visit, 1671 (27%) had regressed to normal values at follow-up. In Poisson regression analyses adjusting for age, sex, race, family history of diabetes and baseline BMI, glycemia and physical activity, in comparison with those with no change or weight gain, those with weight loss ≤2.05kg had a 30% greater probability of returning to normoglycemia (RR=1.30; 95%CI 1.17-1.43) and those with greater weight loss had a 59% greater probability (RR=1.59; 1.44-1.75). Findings were similar for a decreased waist circumference in comparison to no change or a gain (≤2.6cm loss: RR=1.18; 1.05-1.31; >2.6cm loss: RR=1.52; 1.37-1.68). Of the 661 participants newly ascertained with diabetes at baseline and not receiving medication at either visit, 375 (57%) had non-diabetic values at follow-up. Regression among these newly ascertained cases was also greater among those with decreased weight or waist circumference, though only statistically significant for those with a greater decrease in weight (>2.7kg loss: RR=1.39; 1.19-1.62) or waist circumference (>2.6cm loss: RR=1.35; 1.14-1.61) Conclusion: Small decreases in weight or waist circumference in a free-living population not receiving structured interventions to prevent diabetes can lead to important improvement in glycemia, with impact on the prevalence of prediabetes and newly ascertained diabetes.

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P077

Glucagon-Like Peptide-1 Receptor Agonists and Cardiovascular Outcomes in Black Patients with Type 2 Diabetes Mellitus: A Meta-Analysis of Recent Cardiovascular Outcome Trials

Efstratios Koutroumpakis, Heinrich Taegtmeyer, David Aguilar, Univ of Texas Health Science Ctr Houston, Houston, TX

INTRODUCTION: The prevalence of type 2 diabetes mellitus (T2DM) is higher in black individuals than non-Hispanic white individuals. Recent cardiovascular (CV) outcome trials have demonstrated CV benefit of glucagon-like peptide 1 (GLP-1) receptor agonists in patients with T2DM and high CV risk. Whether the benefit seen in the overall trial population extends to the subgroup of black individuals is not known given the limited sample size. METHODS: We performed a meta-analysis of randomized CV outcome trials published after the issuance of Food and Drug Administration Guidance on antihyperglycemic medications in 2008. RESULTS: Five trials assessing the CV benefit of GLP-1 receptor agonists in T2DM were identified (ELIXA, LEADER, SUSTAIN-6,
EXSCEL, and HARMONY). ELIXA was excluded given the different primary outcome studied and the lack of complete outcome data by race. The four trials included in this meta-analysis enrolled 36,852 individuals, including 2,101 black participants (6%). The prevalence of black patients in the individual clinical trials ranged from 2% in the HARMONY trial to 8% in the LEADER trial. The composite primary outcome of CV death, non-fatal MI, or non-fatal stroke was recorded in 114 out of 1,031 black patients (11%) treated with a GLP-1 analogue compared to 136/1070 (13%) treated with placebo (Hazard Ratio 0.96, 95% Confidence Interval 0.57-1.62). The test for heterogeneity was significant (p=0.04).

CONCLUSIONS: Despite the high prevalence of T2DM in black individuals, they remain underrepresented in the clinical trials assessing the effect of GLP-1 receptor agonists on CV outcomes in T2DM. The results of this meta-analysis suggest heterogeneity in the studies that have been performed to date. Future studies are needed to confirm the benefit of GLP-1 receptor agonists in black individuals with T2DM and high CV risk.

Figure: Hazard ratios of cardiovascular death, non-fatal MI, or non-fatal stroke in black patients with diabetes type 2 treated with a glucagon-like peptide-1 analogue versus placebo.


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residence (OR= 1.41, 95% CI: 0.78-2.55) in the general African migrant population. While the association remained non-significant among non-Black African migrants (OR=0.54, 95% CI: 0.15-1.92), the age-and gender-adjusted model revealed that Black Africans who had lived in the US for 10 years or more were twice more likely to be diabetic compared to those who had lived in the country for less than 10 years (OR=2.02, 95% CI: 1.09-3.77). 

Conclusions: In conclusion, in the US, the association between length of residence and diabetes was significant for Black Africans and non-significant for non-Black Africans. These results suggest the need for diabetes prevention programs that acknowledge the racial and cultural diversity of African migrants.

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Funding Component:

P079

Prediction of All-Cause Mortality in Diabetic Patients

Augusto Filippo Di Castelnuovo, Simona Costanzo, Marialaura Bonaccio, Amalia de Curtis, Mariarosaria Persichillo, Chiara Cerletti, Maria Benedetta Donati, Giovanni de Gaetano, Licia Iacoviello, IRCCS Neuromed, Pozzilli, Italy

Introduction

Diabetic people have an increased risk of developing health problems, including macrovascular complications, and have more than double risk of death for any causes. Early identification of high-risk diabetic patients is therefore important so that appropriate interventions can be provided to help reduce the risk of premature mortality.

Hypothesis

The purpose of this study was to investigate factors associated with all-cause mortality in diabetic patients and create a mortality risk calculator to aid in treatment decisions.

Methods

Longitudinal analysis on 2,286 patients with type 2 diabetes individuated in the general population of the Moli-sani study, a population-based cohort study that recruited 24,325 men and women aged≥35 yr of Southern Italy, 2005-2010. Diabetes was defined as use of antidiabetic treatment or fasting blood glucose ≥126 mg/dL at baseline. The cohort was followed up until December 31st 2015. Overall mortality was assessed by the Italian mortality registry (ReNCaM registry) and validated by Italian death certificates. Association of risk factors with mortality was assessed by multivariable Cox-regression survival analysis. A global score for mortality was obtained summing up scores (σ) obtained as rescaled beta coefficients of the Cox regression for each conditions.

Results

Over a median follow-up of 7.8 years (17,652 person-years), 318 all-cause deaths were ascertained.

Starting from a large panel of potential risk factors, we settled a final multivariable model including conditions independently associated with all-cause mortality, specifically: age (σ=0, 2 or 7 for age<55 yr, 55-70 yr or ≥70 yr, respectively), sex (σ=0 or 2 for women or men), diabetic drugs in use (σ=0, 1 or 2 for none, yes but not insulin, insulin, respectively), history of cardiovascular disease (σ=0 or 2 for no or yes), cigarette smoking (σ=0, 2 or 3 for no, former or current), C-reactive protein (CRP) (σ=0, 1 or 3 for CRP≤1 mg/L, 1-2.99 mg/L or 3-10 mg/L), estimated glomerular filtration rate (eGFR, ml/min/1.73m²) (σ=0, 1 or 3 for eGFR≥90, 60-90 or <60) and adhesion to Mediterranean Diet (σ=0, -1 or -2 for low (0-3 points), intermediate or high adhesion (≥6 points)). C-statistic for the final model was 0.74. Diabetic patients stratified according to global score clearly were discriminated as mortality risk; specifically hazard ratio and predicted risk of death at 10 years were 1.0 (referent) and 4.5%, 2.80 (95%CI: 2.00 to 3.93) and 12.1% and 8.47 (6.14 to 11.68) and 32.2% for values of the global
score 0 to 5 (prevalence 15.7%), 8 to 10 (19.9%) and 14 to 24 (16.8%), respectively (P for difference in Kaplan-Meier curves <0.0001).

Conclusions
A global score of risk for all-cause mortality in diabetic patients has been developed, easy to use in clinical practice which include classical CVD risk factors and indicators of nephropathy, low grade inflammation and adherence to Mediterranean Diet.


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Gut Microbiota, Gut-Derived Metabolites and Glucose Metabolism: Findings From a Monozygotic Twin Study

Yun Zhu, Univ of Florida, Gainesville, FL; Eric Strachan, Emily Fowler, Tamara Bacus, Peter Roy-Byrne, Univ of Washington, Seattle, WA; Jinying Zhao, Univ of Florida, Gainesville, FL

Background: Gut microbiota dysbiosis disturbs metabolic homeostasis and contributes to a range of metabolic disorders including CVD and diabetes. Previous epidemiological studies using unrelated individuals may be confounded by age, sex, maternal diet, and early familial factors as well as many unknown or unmeasured factors. Using a well-matched co-twin control design, we examined the relationship between gut microbiome, gut-derived metabolites, and glucose metabolism in monozygotic twin pairs.

Objective: To identify gut microbiome (both composition and abundance) and microbial metabolites associated with host plasma glucose and HbA1c, independent of potential confounding factors.

Methods: This study included 37 monozygotic twin pairs (N=74, mean age 38.2 years old, 68.4% females). Gut microbiome profiles were assessed by 16S rRNA sequencing of the V4 hypervariable region. Concentrations of gut-derived metabolites in plasma were detected using untargeted LC-MS. After stringent QC, we obtained 89 operational taxonomic units (OTUs) at the genus level and 43 microbial metabolites in all twin pairs. The correlation between α-diversity (within-sample diversity, a higher α indicates higher richness of a bacterial species) and plasma glucose or HbA1c was estimated by Spearman correlation. The association of plasma glucose or HbA1c with each OTU or concentration of microbial metabolites was examined by matched twin pair analysis, adjusting for BMI, lipids, smoking, alcohol drinking and depression. Multiple testing was controlled by Bonferroni correction (P<0.0005 for OTUs, P<0.001 for metabolites).

Results: The α-diversity measured by Simpson Index was positively correlated with both HbA1c (r²=0.51, p=0.032) and fasting glucose (r²=0.48, p=0.043). Of the 89 OTUs at the genus level, abundances of Ruminococcaceae, Lactobacillus, Lachnospiraceae, and Oscillibacter were positively associated with both HbA1c (adjusted-P<0.0004) and fasting glucose (adjusted-P<0.0005), whereas abundances of Holdeanella and Solobacterium were positively associated with HbA1c (adjusted-P < 0.0005) and threonine, were significantly associated with HbA1c and glucose (all adjusted-P < 0.001).

Conclusions: Altered gut microbiota (both composition and abundance) and gut-derived microbial metabolites are associated with glucose metabolism, independent of potential confounding variables.


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P081

Applying Precision Public Health Tools to Address Health Disparities Among African-Americans in Alachua County, Florida

Andrew S. Cistola, Univ of Florida, Gainesville, FL

Precision Public Health (PPH) is the application of public health tools to population subsets with tailored interventions resulting in quantitative improvements in overall population health. The goal of PPH is to move from general impact to specific impact with interventions while maintaining a population focus in our outcomes. Precision Public Health at the University of Florida (PPH@UF) is a multidisciplinary workgroup established in 2017 for the purpose of pursuing PPH practices. The primary product of the workgroup is the PPH@UF Libguide: a PPH focused tool designed to be a single place for public health workers to find necessary resources they need to understand their community and create effective interventions. Using the resources in this tool can help existing or new public health workers and researchers move from general population analysis towards precision in their interpretation of the data. This poster has two goals: 1) To show how the resources from the PPH@UF Libguide can be used to address health disparities among African-Americans in Alachua County and 2) To provide an example of how a PPH tool can increase the precision in population analysis aimed toward recommending interventions. The study utilized the PPH@UF Libguide to investigate a commonly known disparity between African-American and Caucasian diabetes deaths in Alachua County. By translating demographic data and investigating diabetes hospitalization, prevalence of diabetes by age over time, and population characteristics of relevant census tracts in Alachua County, we identified two specific census tracts that have significantly higher density of these individuals at risk. Using data from the Centers for Disease Control and presented by the Robert Wood Johnson Foundation, we were also able to observe that these tracts had very high rates of annual doctor visits but very low insurance rates and few locally available core preventative services. This indicates that interventions focusing on preventative care outside of doctor’s offices and connecting individuals to currently available community resources may be most helpful. The PPH@UF Libguide includes many different community partners who would be able to supply these types of resources and can serve not only as a research tool but also as a way to sort community health providers. Any intervention would include training individuals to access information on the PPH@UF Libguide for the needs of community members. By identifying a major community issue and providing a more precise geographic scope, supportive and integrated data, and a practical focus, the PPH@UF Libguide shows its ability to make efforts to address disparities among African-Americans in our community more effective. In conclusion, community health workers and advocates can utilize PPH tools similar to the PPH@UF Libguide to increase the impact and value of their community interventions.

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P082

Mortality in NSTEMI With Tachycardia is Influenced by Diabetes

Ebenezer Oni, Adegbola Oluwole, Behnam Bozorgnia, Albert Einstein Medical Ctr, Philadelphia, PA

Background: The presence of arrhythmias has been shown to predict mortality in patients
presenting with Acute coronary syndrome. We evaluated if the association of Tachycardia and Mortality in Non-ST Elevation myocardial infarction (NSTEMI) patients was independent of the presence of diabetes. **Methods:** Our study population included patients admitted for NSTEMI in a single center between 08/01/2016 and 09/30/2012. Diabetes (DM) was defined by a documented diagnosis or use of diabetic medication. Tachycardia was defined as heart rate (HR) >100 bpm. **Results:** A total of 543 patients were included in this analysis. The mean age was 66 ± 0.6 years, 50% (n=269) were diabetics, and mortality was 10% (n=54). In an unadjusted logistic regression, Tachycardia increased the odds of mortality, OR 2.05 (CI 1.15-3.65), p=0.016. After adjusting for all the risk factors and confounding variables, the relationship was no longer significant. This was however different after stratifying by the presence of diabetes. Diabetics had about four times the probability odds of death compared to non-diabetics in the fully adjusted model. See Table 1. **Conclusion:** The association of tachycardia and mortality in patients who presented with NSTEMI was dependent on the presence of diabetes. The study emphasizes the impact of diabetes on cardiovascular disease.

<table>
<thead>
<tr>
<th></th>
<th>All OR (CI 95%)</th>
<th>Diabetic OR (CI 95%)</th>
<th>Non-Diabetic OR (CI 95%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1</td>
<td>2.04 (1.14-3.65), p=0.02</td>
<td>2.72 (1.72-4.35), p=0.04</td>
<td>1.03 (0.49-2.26), p=0.99</td>
</tr>
<tr>
<td>Model 2</td>
<td>2.21 (1.53-3.16), p=0.01</td>
<td>6.38 (1.12-2.50), p=0.02</td>
<td>1.03 (0.49-2.26), p=0.99</td>
</tr>
<tr>
<td>Model 3</td>
<td>1.83 (0.89-3.77), p=0.11</td>
<td>3.94 (1.61-9.44), p=0.005</td>
<td>0.55 (0.15-1.75), p=0.289</td>
</tr>
</tbody>
</table>

*Model 1 unadjusted, Model 2 adjusted for age and presence of CAD, Model 3= model 2 + hypertension, hyperlipidemia, smoking history, CVD, family history of heart disease and LV systolic ejection fraction.

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**P083**

**Relationship Between Prevalent Cardiovascular Disease and 6-Year Incidence of Diabetes: Findings From the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)**

**Celestin Missikpode,** Univ of Illinois at Chicago, Chicago, IL; Ramon A Durazo-Arvizu, Richard S Cooper, Loyola Univ Chicago, Chicago, IL; Sheila F Castaneda, Gregory A Talavera, Linda C Gallo, San Diego State Univ, San Diego, CA; Maria M Llabre, Marisa J Perera, Univ of Miami, Miami, FL; Krista M Perreira, Univ of North Carolina, Chapel Hill, NC; Martha Davagli, James P Lash, Univ of Illinois at Chicago, Chicago, IL

**Introduction.** Cardiovascular disease (CVD) may prevent the adoption of healthy lifestyle habits such as physical activity, and thus may lead to weight gain and increased risk for lifestyle-related conditions such as diabetes mellitus (DM). Evidence suggests that medications commonly used in the management of CVD such as diuretics, β blockers, and statins are also associated with increased risk of diabetes. We examined the association of CVD with incident DM and investigated whether this association is mediated by change in BMI or medication use. **Methods.** Data from the HCHS/SOL Visit 1 (2008-2011) and Visit 2 (2014-2017) examinations were used to compare incidence of DM among persons with and without CVD at Visit 1. DM was defined using the American Diabetes Association criteria, and prevalent CVD using the Framingham Heart Study definition (i.e., self-reported history of coronary heart disease, cerebrovascular events, peripheral artery disease, or heart failure). Of the 8672 participants free of DM at Visit 1 and with complete data on DM at Visit 2 and on key covariates of interest, 2191 (25.3%) had prevalent CVD at baseline. A total of 2050 participants with CVD were matched to controls free of CVD at Visit 1 using 1:1 propensity matching. Covariates included in the propensity model were age, gender, educational attainment, marital status, Hispanic background, history of hypertension, family history of diabetes, health insurance coverage, chronic kidney disease at baseline, gestational diabetes, high cholesterol, metabolic syndrome, alcohol use, cigarette pack years, physical
activity level, diet quality based on alternative healthy eating index, baseline BMI, baseline prediabetes. Matched pairs were analyzed. McNemar's test was used to compare incidence of DM among cases and controls. The mediating effects of change in BMI and medication use were examined.

Results.
Covariate distributions were similar among participants with and without CVD. The incidence of DM among persons with CVD was 15.7% vs. 13.6% among those without CVD (p=0.06). No natural direct effect of CVD on DM was found. The association between CVD and incidence of DM was not mediated by change in BMI. On average, BMI increased by 0.38 (SE=2.56) and 0.33 (SE=2.50) among persons with and without CVD, respectively (p=0.55). The association between CVD and DM was indirectly mediated by the use of beta-blockers (percent mediated=24.8%), statins (percent mediated=9.8%), and diuretics (percent mediated=8.9%).

Conclusion.
There is slight evidence that medications used to treat CVD increase risk for new onset diabetes.


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P084

Neighborhood Deprivation is Associated With Diabetes Complications: Results From the UCSF Population Health Data Initiative

Mary E Lacy, Courtney R Lyles, Univ of California, San Francisco, San Francisco, CA; Kirsten Bibbins-Domingo, Mark J Pletcher, Univ of California, San Francisco, San Francisco, CA

Introduction: Although neighborhood-level factors influence diabetes and diabetes complications, these determinants are often ignored in clinical practice. The widespread use of electronic medical records (EMR) represents a unique opportunity to incorporate these factors into clinical decision making through geocoding of a patient’s residential address. However, despite increasing interest, few examples exist of how to leverage geospatial data within a clinical care system to inform patient care. The objective of this study is to examine the association between neighborhood deprivation and diabetes complications using geocoded address and clinical data extracted from patients’ EMR.

Methods: Using retrospective EMR data from UCSF Health (01/01/2015-06/30/2018), we identified a cohort of patients with diabetes using a combination of labs, diagnosis codes and medications (n=9,876). Patients’ residential addresses were extracted from EMR, geocoded, and assigned to census block/track. Area deprivation index (ADI) was calculated for each census block/track, categorized as high neighborhood-level deprivation (ADI ≥80th percentile) or not (ADI <80th percentile), and linked to patient-level data. ADI includes 17 measures of education, employment, housing-quality, and poverty and incorporates information from the Census and American Community Survey. We used logistic regression models to examine the association between ADI and the following diabetes-related outcomes: poor glycemic control (HbA1c ≥9%), severe hypoglycemia (ICD-9/10 codes for hypoglycemia-related ED visit or hospitalization), and retinopathy (ICD-9/10 codes). Models were adjusted for age, sex, race/ethnicity, and insurance coverage. Hypoglycemia and retinopathy models were additionally adjusted for last available HbA1c measure.

Results: In fully-adjusted models, high
neighborhood-level deprivation was associated with increased risk of poor glycemic control (OR: 1.18, 95% CI: 1.01, 1.40) and severe hypoglycemia (OR: 1.35, 95% CI: 1.04, 1.76). Conversely, high neighborhood-level deprivation was associated with decreased risk of retinopathy (OR: 0.78, 95% CI: 0.63, 0.96).

Conclusions: Using EMR data, after controlling for several patient-level factors, neighborhood-level deprivation was associated with increased risk of poor glycemic control and severe hypoglycemia and decreased risk retinopathy. Understanding the patient’s broader social context could help inform risk stratification and tailoring of diabetes management. Future analyses will more fully characterize patients’ clinical and utilization-related characteristics and will include additional diabetes complications such as nephropathy, neuropathy and chronic kidney disease. This study represents an example of how neighborhood-level data obtained through patient’s EMR could be used to inform clinical practice.

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P085

Extremes of Sleep Duration and Type II Diabetes in Older Women Participating in the Women’s Health Study

Jonathan Z Butler, Univ of California San Fran, San Francisco, CA; Natalie Slopen, Univ of Maryland Coll Park, College Park, MD; Susan Redline, Brigham and Women’s Hosp, Boston, MA; Mercedes Carnethon, Northwestern Univ, Chicago, IL; David R Williams, Harvard Sch of Public Health, Boston, MA; Tiffany M Powell-Wiley, Natl Heart, Lung and Blood Inst, Bethesda, MD; Aruna Pradhan, Julie Buring, Brigham and Women’s Hosp, Boston, MA; Michelle A Albert, Univ of California San Fran, San Francisco, CA

Background: Extreme sleep duration defined as either short (<6 hours) or long (>9 hours) sleep is positively associated with cardiovascular disease (CVD). Because sleep disturbance is prevalent in older women, we evaluated the relationship between extremes of sleep duration and type II diabetes (diabetes) in older women. Methods and Results: In a cross-sectional analysis, we examined the association between self-reported short and long sleep duration and diabetes among 21,769 older women (mean age = 71.2 ± 6.0 years old) participating in the ongoing follow-up cohort of the Women’s Health Study. Compared to women with diabetes (N=2539) who slept an average of 6-9 hours, diabetic women who reported short sleep were younger, more likely to be current smokers, less likely to use 1+ drinks/day, were less physically active, had lower annual household income and were less likely to possess a bachelor’s degree. Diabetic women who reported long sleep were older, less likely to be a current smoker, more likely to drink 1+ drinks/day, more likely to have hypertension, depression and anxiety symptoms, were less likely to have a bachelor’s degree, and had a lower annual household income. Logistic regression analyses adjusted for age and race/ethnicity revealed that both short [OR, 95% CI: 1.86 (1.48-2.34)] and long [OR, 95% CI: 1.49 (1.34-1.66)] sleep were significantly associated with a higher odds of diabetes (reference = 6 to 9 hrs sleep). These significant relationships persisted but were somewhat attenuated after control for CVD risk factors and psychological status (i.e., depression and anxiety symptoms) [Short: OR, 95% CI: 1.38 (1.07-1.70); Long: 1.28 (1.14-1.45)]. Conclusion: Extremes of sleep duration were significantly associated with higher odds of diabetes in older women participating in the Women’s Health Study. These hypothesis-generating data suggest that short and long sleep duration might confer key heightened cardiometabolic risk even in older women.
Significant Association of House Collapse With High Urine Na/K Ratios Among 24,580 Coastal Residents Who Survived the Great East Japan Earthquake

Takahiro Mikami, Kozo Tanno, Ryohei Sasaki, Nobuyuki Takanashi, Yuka Kotozaki, Iwate Medical Univ, Iwate, Japan; Atsushi Hozawa, Mana Kogure, Shinichi Kuriyama, Ichiro Tsuji, Tohoku Univ, Miyagi, Japan; Mamoru Sato, Jiro Hitomi, Kiyomi Sakata, Makoto Sasaki, Iwate Medical Univ, Iwate, Japan

Introduction There is an association between dietary sodium/potassium intake and the pathogenesis of hypertension and cardiovascular disease. Some reports have indicated a correlation between psychological distress and high sodium intake. Victims who are affected by natural disasters tend to consume an unbalanced diet, with high sodium and low potassium levels, which may stem partly from high psychological distress due to natural disasters. Hypothesis We tested the hypothesis that house collapse was associated with high urine Na/K (UNa/K) ratios in victims of the Great East Japan Earthquake. We also hypothesized that psychological distress could modify the relationship between house collapse and UNa/K ratio. Methods We analyzed complete data collected from 24,580 coastal residents who did not take anti-hypertensive medications, were 20 to 74 years of age, and were enrolled in the Tohoku Medical Megabank Project Community-based Cohort (TMM CommCohort) Study. Participants were recruited between 2013 and 2015 at municipality-specific health checkup sites in the Iwate and Miyagi Prefectures. UNa/K ratios were assessed using spot urine samples. Participants were classified into four groups according to the extent of house collapse: total collapse (TC, n=4206); half collapse (HC, n=2825); partial collapse (PC, n=5964); and no damage (ND, n=11585). Using a covariance analysis, the multivariate-adjusted geometric means of the UNa/K ratios according to the group of house collapse were calculated, with adjustments for sex, age, systolic blood pressure, estimated glomerular filtration rate, HbA1c level, low-density lipoprotein cholesterol level, Kessler Psychological Distress Scale (K6) score, current alcohol consumption, current smoking habits, and daily exercise. In addition, after stratification according to K6 score (9/10), the multivariate-adjusted geometric means of the Una/K ratios were calculated according to house collapse group. Results The multivariate-adjusted geometric means (95% confidence intervals) of UNa/K ratios of those whose houses underwent TC, HC, and PC were 3.33 (3.28-3.39), 3.37 (3.30-3.44), and 3.34 (3.30-3.40), respectively, all of which were significantly greater than the value of 3.23 (3.20-3.27) that was observed for the ND group. In analysis stratified by K6 score, the same tendencies were observed in both groups of K6<10 and K6≥10. Conclusions House collapse was significantly associated with high UNa/K ratios, and psychological distress did not modify this association.


Funding: No

Funding Component:

P087

Dietary Flavonoids Intake Reduced the C-Reactive Protein Concentration, Yet Did Not Associate With the Risk of Metabolic Syndrome Among Taiwanese Adults: A Representative National Study

Kuo-Liong Chien, Jui Wang, Cheng-Tzu Hsieh, Natl Taiwan Univ, Taipei, Taiwan

Background and Hypothesis: Evidence about the role of various flavonoids in atherosclerosis prevention was still controversial. We investigated the association between dietary flavonoid intakes and the level of C-reactive protein as well as the risk of metabolic syndrome among a national representative sample from the Nutrition and Health Surveys in Taiwan during 2005 and 2008.

Methods: A total of 2439 adult participants (51.9% women, 54.3±17.6 years) who provided detailed food frequency questionnaire and clinical as well as biochemical data were recruited. We measured total and six flavonoids, including flavone, flavonol, flavanones, flavan_3_ol, anthocyanidins, and isoflavones from the USDA Database for the Flavonoid Content of Selected Foods. C-reactive protein was measured by nephelometry. Definition of metabolic syndrome was followed using the Third Adult Treatment Panel criteria, with a modification of the criteria for Asian population.

Results: The mean dietary total flavonoid intake was 142.6±306.0 mg/day (median, 42.9, interquartile range, 11.2-137.2 mg/day). C-reactive protein was inversely related to various dietary intakes, including flavone, flavonol, flavan_3_ol, anthocyanidins, and total flavonoids (coefficients ranging from -0.04 to -0.06, all P<0.05). After adjusted for age and gender, participants among the highest quantile of dietary flavonol intake has a significant lower C-reactive protein concentration (-0.075±0.037 mg/dL), compared with those among the lowest quartile (P test for trend, 0.07). Participants among the highest total flavonoid intake have a lower C-reactive protein level (-0.096±0.037 mg/dL, P test for trend, 0.046). With regards to the risk of the metabolic syndrome, a higher dietary flavonoid intake was not associated with metabolic syndrome status (adjusted odds ratio, 0.96, 95% confidence interval, 0.73-1.89 for flavonol, P test for trend, 0.57).

Conclusions: We demonstrated that dietary flavonoid intakes were inversely associated with the C-reactive protein concentration. Further intervention trials are warranted to elucidate the biological mechanism of protective effect of flavonoids.


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P088

Assessing the Use of a Preventive Cardiology Lifestyle Screening (PCLS) Tool in a Pediatric Sub-Specialty Lipid Clinic

Suzanne Skylar Griggs, Boston Children’s Hosp, Boston, MA

OBJECTIVE: Lifestyle modification is recommended to improve cholesterol levels in the pediatric population with the goal of reducing CVD risk. Existing tools assessing pediatric lifestyle habits are cumbersome and lack specificity. We developed the Preventive Cardiology Lifestyle Screen (PCLS) to assess behaviors relevant to CVD risk, and evaluated its use in a subspecialty lipid clinic at a large pediatric teaching hospital.

METHODS: Eligible participants were 2-21 years
old, English speaking and presenting for care in a pediatric lipid clinic. We evaluated test-retest agreement using weighted kappa statistics, and validity of PCLS compared to longer research questionnaires (Block Food and Activity Questionnaires and Rapid Eating Assessment for Patients (REAP)) using Spearman correlation coefficients.

RESULTS: Participants (n = 138) had a mean age of 13 years; 50% were female, 22% reported a household income <$50,000. Median non-HDL cholesterol was 149.2 mg/dL and HDL cholesterol was 48 mg/dL. Of participants 2-17 years old (n=122), 15% were overweight and 46% were obese. Test re-test agreement for those ≥10 years (n=24) was good (weighted kappa >.75) for fruits and vegetables (0.83, 0.82 respectively), chicken no skin (0.89), processed meats (0.78) and sports drinks (.75). Test-retest agreement was poor (weighted kappa <.50) for regular soda intake (0.40), regular fat dairy (0.47), and eating lunch (0.45). Activity (sports 0.94 gym class 0.77) and inactivity (weekend video games 0.88 hours of sleep 0.78) overall had high test-retest agreement for most questions. Examining across dietary domains, the PCLS performed well at baseline compared to the BLOCK and REAP surveys in the domains of saturated fat, glycemic index, sodium and fiber (Table 1)

CONCLUSION: The PCLS performed well on test re-test agreement, and responses correlated with previously validated research tools in most domains. This tool shows promise for use in the care of children with CVD lipid disorders.

Table 1. Validity of PCLS with Block Food Frequency Questionnaire and Rapid Eating Assessment for Patients (REAP)

<table>
<thead>
<tr>
<th>Domain</th>
<th>PCLS vs REAP</th>
<th>PCLS vs BLOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturated Fat</td>
<td>133 (0.41)</td>
<td>100 (0.58)</td>
</tr>
<tr>
<td>Glycemic Index</td>
<td>132 (0.46)</td>
<td>91 (0.65)</td>
</tr>
<tr>
<td>Sodium</td>
<td>137 (0.39)</td>
<td>108 (0.51)</td>
</tr>
<tr>
<td>Fiber</td>
<td>130 (0.37)</td>
<td>103 (0.71)</td>
</tr>
</tbody>
</table>

Disclosures: S. Griggs: None.

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were strongly adherent to the dietary pattern, even after adjustment for the other factors (table). Markers of socioeconomic status were strong predictors in unadjusted models but after adjustment for race, they were attenuated. Black race was the most potent predictor of a higher adherence to a Southern dietary pattern in REGARDS. As this diet is strongly associated with risk of several incident diseases, further work should focus on the contribution of this diet to broad racial disparities in chronic disease and life expectancy.

**Table. Predictors of Southern Diet Score**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Unadjusted Effect Size</th>
<th>P</th>
<th>Fully adjusted for all other predictors Effect Size</th>
<th>P</th>
<th>Darrell-partial Effect Size</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.045</td>
<td>&lt;0.001</td>
<td>-0.016</td>
<td>0.0214</td>
<td>0.0005</td>
<td></td>
</tr>
<tr>
<td>Black participants</td>
<td>0.852</td>
<td>&lt;0.001</td>
<td>0.780</td>
<td>&lt;0.001</td>
<td>0.1661</td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>0.224</td>
<td>&lt;0.001</td>
<td>-0.430</td>
<td>&lt;0.001</td>
<td>0.0307</td>
<td></td>
</tr>
<tr>
<td>Residing in Southeast (AL, GA, TN, LA, SC, NC, Ark, MS)</td>
<td>0.234</td>
<td>&lt;0.001</td>
<td>0.209</td>
<td>&lt;0.001</td>
<td>0.0233</td>
<td></td>
</tr>
<tr>
<td>Did not graduate from college</td>
<td>0.425</td>
<td>&lt;0.001</td>
<td>0.195</td>
<td>&lt;0.001</td>
<td>0.0259</td>
<td></td>
</tr>
<tr>
<td>Income &lt; $75000</td>
<td>0.304</td>
<td>&lt;0.001</td>
<td>0.103</td>
<td>&lt;0.001</td>
<td>0.0395</td>
<td></td>
</tr>
<tr>
<td>Current smoker</td>
<td>0.401</td>
<td>&lt;0.001</td>
<td>0.208</td>
<td>&lt;0.001</td>
<td>0.0090</td>
<td></td>
</tr>
<tr>
<td>Living in a flood desert</td>
<td>0.390</td>
<td>&lt;0.001</td>
<td>0.042</td>
<td>0.0275</td>
<td>0.0002</td>
<td></td>
</tr>
<tr>
<td>Neighborhood disadvantage</td>
<td>0.311</td>
<td>&lt;0.001</td>
<td>0.065</td>
<td>&lt;0.001</td>
<td>0.0067</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>0.027</td>
<td>0.016</td>
<td>0.052</td>
<td>0.0016</td>
<td>0.0004</td>
<td></td>
</tr>
<tr>
<td>High Mediterranean diet score</td>
<td>-0.062</td>
<td>&lt;0.001</td>
<td>-0.542</td>
<td>&lt;0.001</td>
<td>0.0060</td>
<td></td>
</tr>
<tr>
<td>Report of 4 or more depressive symptoms</td>
<td>0.340</td>
<td>&lt;0.001</td>
<td>0.145</td>
<td>&lt;0.001</td>
<td>0.0028</td>
<td></td>
</tr>
<tr>
<td>Reporting no physical activity</td>
<td>0.146</td>
<td>&lt;0.001</td>
<td>0.081</td>
<td>0.0003</td>
<td>0.0011</td>
<td></td>
</tr>
<tr>
<td>Regularly forgetting medications</td>
<td>0.096</td>
<td>&lt;0.001</td>
<td>0.023</td>
<td>0.0132</td>
<td>0.0003</td>
<td></td>
</tr>
<tr>
<td>Increased stress</td>
<td>0.033</td>
<td>0.028</td>
<td>-0.022</td>
<td>0.1021</td>
<td>0.00000015</td>
<td></td>
</tr>
<tr>
<td>Reporting Excellent or Very Good self-rated health</td>
<td>-0.210</td>
<td>&lt;0.001</td>
<td>-0.062</td>
<td>&lt;0.001</td>
<td>0.0023</td>
<td></td>
</tr>
</tbody>
</table>

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Funding: No

Funding Component: P091

**Short-term Increased Dietary Potassium From Potato and Potassium Gluconate Has No Effect on Blood Pressure and Microcirculation in Pre-hypertensive-to-hypertensive Adults**

Michael S Stone, Berdine R Martin, Purdue Univ, Nutrition Science, West Lafayette, IN; George P McCabe, Purdue Univ, Statistics, West Lafayette, IN; Linda D McCabe, Connie M Weaver, Purdue Univ, Nutrition Science, West Lafayette, IN

Potassium is an essential nutrient of concern according to recent Dietary Guidelines for Americans Advisory Committees, with less than 3% of the population meeting the current adequate intake (AI) level of 4700mg/d. Increases in potassium intake have been linked to improvements in cardiovascular and other metabolic health outcomes. Blood pressure (BP) is currently the primary criterion for determining potassium requirements. In this clinical trial, we assessed the effects of increasing potassium intake on BP and microcirculation (endothelial function). Thirty pre-hypertensive-to-hypertensive (Systolic BP ≥ 120mmHg) men (N=15) and Women (N=15) with a mean ± SD age, BMI, and BP (systolic(SBP)/ diastolic(DBP)) of 48.2 ± 15 y, 31.4 ± 6.1, and 136.3 ± 11.9/ 86.1 ± 7.1 mmHg, respectively, were enrolled in a cross-over randomized control diet trial. Participants were assigned to a random order of four 16-day dietary potassium interventions including a basal diet (control) of 2300mg/d(~60mmol/d), and three periods of an additional 1000mg/d(3300mg/d(~85mmol/d) total) of potassium in the form of potatoes (baked, boiled, or pan-heated with no additional fat), French fries, or a potassium gluconate supplement. Each intervention period was separated by two or more weeks of wash out. Blood pressure was measured in triplicate using manual auscultation on days 1, 4, 6, 8, 11, 13, 15, 16, and 17 of each intervention. Microvascular and endothelial function were assessed via thermal hyperemia, utilizing laser Doppler flowmetry (LDF), at baseline and at the
end of each intervention. Results for differences in both SBP and DBP ± SE were assessed at the end treatment (average of day 15, 16, and 17 measurements) using a mixed model with repeated measures and Dunnett adjustment (P < 0.05), with no significant differences among groups (control: 128.7 ± 2.1/ 83.6 ± 1.6, French fries: 127.7 ± 2.2/ 83.7 ± 1.6, potatoes: 127.6 ± 2.3/ 85.1 ± 1.6, supplement: 128.0 ± 2.2/ 83.7 ± 1.7). Utilizing the same statistical analysis, there were also no significant differences in endothelial function (measured as percent of cutaneous vascular conductance max (%CVCmax) ± SE) among groups (control: 87.4 ± 1.5%, French Fries: 87.7 ± 1.4%, potatoes: 88.3 ± 1.1%, supplement: 88.9 ± 1.0%). In this small, controlled feeding study of short duration, increased potassium from potatoes or supplement achieved 70% of recommended intakes, but had no significant benefit to blood pressure or microvascular function in men and women with higher cardiometabolic risk.

Disclosures:  **M.S. Stone**: B. Research Grant; Significant; Research supported by grant from Potato Board (APRE: Alliance for Potato Research and Education). **B.R. Martin**: B. Research Grant; Significant; Research supported by grant from Potato Board (APRE: Alliance for Potato Research and Education). **G.P. McCabe**: B. Research Grant; Significant; Research supported by grant from Potato Board (APRE: Alliance for Potato Research and Education). **L.D. McCabe**: B. Research Grant; Significant; Research supported by grant from Potato Board (APRE: Alliance for Potato Research and Education). **C.M. Weaver**: B. Research Grant; Significant; Research supported by grant from Potato Board (APRE: Alliance for Potato Research and Education).

Funding: No

Funding Component: P092

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**Age and Gender-specific Associations of Diet Quality and 4-year Weight Change in Non-obese Adults of the Dutch Lifelines Cohort**

**Petra C Vinke**, Daan Kromhout, Gerjan Navis, Eva Corpeleijn, Univ Medical Ctr Groningen, Groningen, Netherlands

**Introduction**: Diet is an important lifestyle factor in strategies for overweight prevention, but little is known about its dependency on contextual factors like age and gender.

**Hypothesis**: We assessed the hypothesis that the strength of the association between diet quality and 4-year weight change differed among age categories and between genders.

**Methods**: From the Dutch Lifelines Cohort, 85,618 non-obese, adult participants were included in the study. At baseline, diet was assessed with a 110-item food frequency questionnaire. The Lifelines Diet Score, based on established evidence-based food groups for the prevention of chronic diseases, was calculated to assess diet quality. For analyses, the score was divided in quintiles. Body weight was objectively measured at baseline and after a median follow-up of 44 months (25th-75th percentile: 35-51 months). In between, body weight was self-reported twice. Linear mixed models were used to investigate the association between diet quality and weight change in 6 age categories (18-29 to 70+) and stratified by gender.

**Results**: Mean 4-year weight change decreased over age categories. Confounder adjusted linear mixed model analyses showed that the association between diet quality and weight change was dependent on age, more so in women (pINTERACTION = 0.001).
Poor diet quality (quintile 1 vs. quintile 5) was most strongly related to 4-year weight gain in young men (estimated mean +1.62 kg) and young women (estimated mean +1.13 kg). In contrast, in women aged 70+, poor diet quality was associated with weight loss (estimated mean -1.80 kg). **Conclusions:** Poor diet quality was prospectively related to higher weight gain, especially in young adults. Oppositely, among women aged 70+, better diet quality was related to less weight loss. Therefore, a healthful diet is a promising target for unintentional weight changes in both directions.

Disclosures: **P.C. Vinke:** None. **D. Kromhout:** None. **G. Navis:** None. **E. Corpeleijn:** None.

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**P093**

**A Nutrition Education Program Through the Farmer’s Market: Lessons Learned From Community-based Research in North Dakota**

**Amir Alakaam**, Univ of North Dakota, Grand Forks, ND

**Introduction:** More than 32% of adults have obesity in North Dakota (ND), cardiovascular diseases and cancer are the leading causes of death, and at least one in ten adults has diabetes in ND. Healthy eating habit has a protective role against chronic diseases and obesity. A community-based nutrition education program was implemented to identify effective and approachable strategies for developing a long-term intervention that increases fruits and vegetables intake and reduces risk of chronic diseases in ND community. **Hypothesis:** (1) Nutrition education would increase intake of fruits and vegetables among participants. (2) Participants who received compensation would be more likely to increase their consumption of fresh fruits and vegetables. **Method:** The pilot program was delivered through the farmer’s market in ND. We delivered six nutrition education sessions focus on the importance of fruits and vegetables on diet, and developing healthy skills related to fruits and vegetables purchasing and cooking. Participants earned a gift certificate at the end of session. Data collected through post-assessment questionnaire. **Results:** Two hundred and thirty nine participants enrolled and benefited from the program. We found significant increase in fruits and vegetables intake among participants. Results show that increasing access to fresh fruits and vegetables, and providing education about healthy food consumption encouraged market’s visitors to purchase fruits and vegetables. **Conclusion:** Nutrition education program through farmer’s market has the potential to increase fruits and vegetables intake. The finding suggests that researcher should implement nutrition education intervention as an approach to positively influence eating habits among community.

Disclosures: **A. Alakaam:** None.

Funding: No

Funding Component:

**P095**

**Temporal Associations Between Lifestyle Self-Efficacy and Adherence to Calorie Goal**

**Yaguang Zheng**, Christopher Imes, Susan M Sereika, Univ of Pittsburgh, Pittsburgh, PA; Stephen L Rathbun, Univ of Georgia, Athens, GA; Lora E Burke, Univ of Pittsburgh, Pittsburgh, PA

**Introduction:** Research has shown self-efficacy (SE) to be positively associated with adherence to calorie goal when assessment is based on participants’ recall; however, when assessed in real-time, their association is unclear. Our aim was to examine temporal associations between
SE for adhering to the daily recommended lifestyle plan and adherence to calorie goal collected in real-time over 12 months.

Methods: Ecological momentary assessment (EMA) was used to assess SE for adhering to the daily recommended lifestyle plan in real-time during a behavioral weight loss study. SE was assessed by one question at the beginning of each day in the person’s natural setting “How confident are you that you will be able to stick to your healthy lifestyle plan today?” SE scores ranged from 1 to 10, with 1 reflecting lowest SE. Daily dietary intake was recorded using the Lose It! app. We calculated adherence to the calorie goal by dividing the total number of calories consumed each day by the daily calorie goal, then multiplying by 100 to express the value as a percentage. Adherence for each day was defined as 85%–115%. The mean weekly SE scores and mean weekly number of days adherent to dietary goals were calculated. Random coefficient modeling was used for analysis.

Results: The sample (N=150) was 90.7% female, 80.7% white, with a mean age (±SD) of 51.1±10.2 years and a mean BMI of 34.0±4.6 kg/m². Mean weekly SE score (b=-0.02, p<.001) decreased from 7.5 to 6.7 beginning at 3 months, while a decline in mean weekly number of days adherent to calorie goal (b=-0.04, p<.001) began immediately (see figure). Weekly SE score was positively associated with weekly number of days adherent to calorie goal (b=0.17, p<.001).

Conclusion: Our study found declines in self-efficacy and adherence to calorie goal assessed in real-time and the positive association between them. Future weight loss interventions need to develop strategies to sustain self-efficacy and prevent declines in adherence to a diet that can support a heart healthy lifestyle.


Funding: No

Funding Component:

P096

Factors Related to Added Sugars Intake Among US Adults With or Without Cardiovascular Diseases

Seung Hee Lee-Kwan, Elizabeth Lundeen, Sandra L Jackson, Heidi M Blanck, Sohyun Park, CDC, Atlanta, GA

Added sugars intake increases risk of obesity, hypertension, dyslipidemia, and cardiovascular diseases (CVD) and may impact disease management. We examined factors related to added sugars intake among US adults with or without CVD and risk factors using 2015 National Health Interview Survey (NHIS) (n=30616). NHIS used the National Cancer Institute (NCI) Dietary Screener Questionnaire (DSQ) to assess individual’s dietary intake. The DSQ used 8 questions to assess added sugar intake over the last 30 days. We used the NCI’s scoring algorithm to convert screener responses to estimate total added sugars intake (tsp/day) by characteristics within 3 strata—adults with a history of heart disease/stroke (CVD, n=4658), adults with hypertension/high cholesterol but without CVD (HTHC, n=10476), and adults without CVD or HTHC (no CVD, n=15482). Because our goal was not to look at association
between added sugar and CVD risk, comparisons among the groups were not made. Characteristics included age, sex, race/ethnicity, education, income, marital status, smoking, and weight status. We used multiple linear regression to assess independent associations between intake and characteristics. Added sugars intake was similar in magnitude across all 3 strata (CVD 16.9, HTHC 17.0, and no CVD 17.3 tsp, respectively). We found increased added sugars intake with younger age, lower education, lower income, and smoking among adults regardless of CVD status. Having obesity was positively related to increased intake for adults without CVD, but no association was found between the weight status and intake in adults with CVD or HTHC. Improving diet may prevent CVD and aid disease self-management. Product reformulation to reduce added sugars and strategies to counsel and support individuals to reduce dietary added sugars may be needed to optimize heart health.

Disclosures: S. Lee-Kwan: None. E. Lundeen: None. S.L. Jackson: None. H.M. Blanck: None. S. Park: None.

Funding: No

Funding Component:

P097

Sociodemographic Differences in the Dietary Quality of Food Purchases Among Participants in the Nationally-Representative Food Acquisition and Purchase Study (FoodAPS)

Maya Vadiveloo, Haley Parker, Univ Rhode Island, Kingston, RI; Filippa Juul, Niyati Parekh, New York Univ, New York, NY

Background: Self-reported dietary data may not accurately represent usual dietary intake. Grocery purchase records provide an objective measure of diet, but little research has explored whether the diet quality of grocery purchases reflects individual-level diet quality and whether it differentiates between groups with known differences in dietary quality. This study evaluated whether there are sociodemographic differences in the dietary quality of grocery purchases akin to those observed in existing individual-level national data.

Hypothesis: The diet quality of grocery purchases will reflect trends observed with individual-level diet quality.

Methods: Grocery purchasing data from 3,961 households in the nationally-representative Food Acquisition and Purchase Study (FoodAPS) were used. Dietary data was collected using hand scanners over 7-days, and demographic data was self-reported. The Healthy Eating Index (HEI) 2015 was used to determine grocery purchase quality, and multivariable-adjusted regression with Tukey adjustment or planned contrasts were used to determine whether HEI-15 scores differed according to food insecurity, Supplemental Nutrition Assistance Program (SNAP) participation, obesity within a household, race/ethnicity, and interactions between these variables. FoodAPS sample weights and Taylor series linearization method for variance estimation accounted for the complex sample design.

Results: Primary respondents were, on average, 50.6 years, non-Hispanic White (70.3%), female (70.2%) and had attended some college (57.8%). The mean HEI-15 score was 54.7; 14.0% of households were food insecure and 12.7% received SNAP benefits. HEI-15 scores differed across all sociodemographic predictors (p<0.05). Additionally, interactions (p<0.1) were detected between SNAP participation and (1) food insecurity and (2) obesity within the household as well as race/ethnicity and obesity within the household. Food secure, non-SNAP households had higher HEI-15 scores than food insecure, SNAP participating households (53.9±0.5 vs. 50.3±0.7, p=0.007) in models adjusted for age, income, smoking, and education. Similarly, non-SNAP households without obesity present had significantly higher HEI-15 scores than all other households. Obesity presence within a household was associated with lower HEI-15 scores in non-
Hispanic White (50.8±0.5 vs. 52.5±0.7, p=0.046), and Black households (48.8±1.5 vs. 53.1±1.4, p=0.018), but not Hispanic households (54.4±1.0 vs. 52.2±1.2, p=0.21).

**Conclusions:** Disparities in the diet quality of grocery purchases reflect individual-level trends and vary based on sociodemographic factors. This analysis highlights the interrelationships between SNAP, food insecurity, race/ethnicity, and obesity within a household, demonstrating how the co-occurrence of risk factors may modify associations with diet quality.

Disclosures: **M. Vadiveloo:** B. Research Grant; Modest; This work is supported by the Rhode Island Foundation Medical Research Grants. **H. Parker:** None. **F. Juul:** None. **N. Parekh:** None.

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Funding Component:

**P098**

The Relationship of Neighborhood Greenness to Heart Disease in 249,405 US Medicare Beneficiaries

**Scott C Brown,** Kefeng Wang, Univ. of Miami Miller Sch of Med, Miami, FL; Joanna Lombard, Univ. of Miami Sch of Architecture, Coral Gables, FL; Tatjana Rundek, Chuanhui Dong, Carolina Marinovic Gutierrez, Univ. of Miami Miller Sch of Med, Miami, FL; Margaret M. Byrne, Moffitt Cancer Ctr, Tampa, FL; Matthew Toro, Arizona State Univ Library, Map & Geospatial Hub, Tempe, AZ; Maria I. Nardi, Jack Kardys, Miami-Dade Parks, Recreation & Open Spaces Dept. (MDPROS), Miami, FL; Li Yi, Univ. of Miami Miller Sch of Architecture, Coral Gables, FL; Jose Szapocznik, Univ. of Miami Miller Sch of Med, Miami, FL

**BACKGROUND.** Nature exposures may be associated with reduced risk for heart disease. The present study examines the relationship between objective measures of neighborhood greenness (vegetative presence) and diagnoses of four forms of heart disease (acute myocardial infarction [AMI], ischemic heart disease, heart failure, and atrial fibrillation), in a large population-based sample of Medicare beneficiaries in Miami-Dade County, Florida.

**METHODS.** The sample included 249,405 Medicare beneficiaries ages 65 years and older whose location (ZIP+4) in Miami-Dade County, Florida, did not change from 2010 to 2011. Analyses examined relationships between greenness, measured by mean Normalized Difference Vegetation Index (NDVI) from satellite imagery at the Census block level, and four forms of heart disease in 2011. A series of hierarchical regression analyses, in a multi-level framework, assessed the relationship of greenness to each heart disease diagnosis, adjusting successively for individual sociodemographics and neighborhood median household income. A further final model adjusted for biological risk factors (diabetes, hypertension, and hyperlipidemia).

**RESULTS.** Higher greenness was generally associated with reduced risk of heart disease, in models adjusting for individual sociodemographics and neighborhood income: When compared to the lowest tertile of greenness, the highest tertile of greenness was associated with statistically significant (ps<.01) reduced odds of AMI by 25% (OR=0.75; 95% CI: 0.63, 0.90), ischemic heart disease by 20% (OR=0.80; 95% CI: 0.77, 0.83), heart failure by 16% (OR=0.84; 95% CI: 0.80, 0.88), and a marginally significant reduced odds of atrial fibrillation by 6% (OR=0.94; 95% CI: 0.87, 1.00, p=0.067). In addition, the highest tertile of greenness was associated with 19% reduced odds of any of the four forms of heart disease (OR=0.81; 95% CI: 0.76, 0.84) when compared to the lowest tertile of greenness, adjusting for individual sociodemographics and neighborhood income. These associations were attenuated in a final model which added biological risk factors, suggesting that cardiometabolic risk factors may at least partly mediate the observed relationships between greenness and heart disease.

**CONCLUSIONS.** Even after adjusting for individual sociodemographics and neighborhood income,
neighborhood greenness may be associated with reduced odds of heart disease, possibly as a result of increased time spent outdoors, physical activity, stress mitigation, and/or air pollution. Results suggest that strategies to reduce inequities in area greenness and improve public access to these areas may be a future means of reducing heart disease at the population level.


**Funding**: No

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**Heart Rate Variability Differences Between Green and Suburban Walking: A Pilot Crossover Study**

**Zachary C. Pope**, Junia N. Brito, Nathan R. Mitchell, Univ of Minnesota, Sch of Public Health, Minneapolis, MN; Ingrid E. Schneider, Univ of Minnesota, Dept of Forest Resources, St. Paul, MN; Teresa H. Horton, Northwestern Univ, Dept of Anthropology, Evanston, IL; Mark A. Pereira, Univ of Minnesota, Sch of Public Health, Minneapolis, MN

**Introduction**: Heart rate variability (HRV) assesses the sympathetic and parasympathetic innervation of the heart. Lower HRV indicates greater sympathetic tone and is associated with adverse cardiovascular outcomes. During exercise, factors like activity intensity influence HRV. Yet, an environment’s inherent anxiety/stress-promoting characteristics may also affect HRV.

**Hypothesis**: Given nature’s calming characteristics, we hypothesized green (i.e., nature-based) walking would promote higher HRV and less HRV reduction than suburban walking.

**Methods**: Twenty-four middle-aged adults (20 female; 49.3 ± 6.7 yrs; BMI: 30.7 ± 7.9 kg/m²) participated in this nine-week crossover study comprised of once-weekly 50-minute moderate-intensity walking sessions. Participants walked for three weeks in each of two treatment conditions: (1) green walking: nature-based walking on trails of local arboretum; and (2) suburban walking: walking on sidewalks of a local suburb’s downtown area. Half were assigned to suburban walking in the first treatment period, and half completed green walking first. A two-week washout separated treatments. The Zephyr BioHarness 3 assessed HRV—reported as standard deviations of normal-to-normal RR intervals in milliseconds (ms) while also tracking activity intensity. For analysis, walks were split into 15-minute intra-walk phases with the first, second, and third phases representing each walk’s beginning, middle, and end. Five-minute pre- and post-walk sitting phases for HRV were also created. Linear mixed models with repeated measures evaluated HRV phase differences between treatments and HRV change between phases by
treatment.

**Results:** Lower HRV was observed during the pre-walk sitting phase in the green (56.5 ms) vs. the suburban walking treatment (62.4 ms; \( p = 0.04 \)); however, a sequence effect was present (\( p = 0.02 \)). Due to lower walking intensity during green walking (0.31 g vs. 0.27 g; \( p < 0.01 \)), activity intensity was a covariate in all intra-walk analyses. Intra-walk phase analyses revealed higher green vs. suburban walking HRV during the second (29.1 ms vs. 24.2 ms, respectively; \( p < 0.01 \)) and third (33.9 ms vs. 23.8 ms, respectively; \( p = 0.03 \)) phases. Further, less HRV reduction was seen between the first and second intra-walk phases during green (-7.6 ms) vs. suburban walking (-12.4 ms; \( p = 0.05 \)). Between-treatment HRV differences were not found for the post-walk sitting phase. No sequence effects were observed for the intra-walk or post-walk phases. Finally, no carryover effects were observed—suggesting adequate washout between treatments.

**Conclusions:** Green walking elicits higher HRV and less HRV reduction vs. suburban walking. Activity intensity did not explain these observations. Fully powered longer-term trials should rigorously evaluate green walking’s potential anxiety/stress-reducing characteristics.

Disclosures: **Z.C. Pope:** None. **J.N. Brito:** None. **N.R. Mitchell:** None. **I.E. Schneider:** None. **T.H. Horton:** None. **M.A. Pereira:** None.

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**P100**

**Geographic Disparities in Hypertensive Disorders of Pregnancy: An Environment-Wide Association Study**

Hui Hu, Thomas A. Pearson, Jinying Zhao, Mattia Prosperi, Sonja A. Rasmussen, Xiao Hong, Linda B. Cottler, Univ of Florida, Gainesville, FL

Hypertensive disorders of pregnancy (HDP) are significant contributor to maternal and infant morbidity and mortality, and large geographic disparities exist. Although the importance of an individual’s surrounding environment as a potentially modifiable risk factor for HDP has been recognized and multiple environmental factors have been associated with HDP, only a few components in the environment have been assessed, often separately, with no consideration of the totality of environment. To address this, we conducted an environment-wide association study (EWAS) using the Florida Vital Statistics Birth Records including 2,119,324 women with conception dates between January 1, 2005 and December 31, 2014. EWAS is an agnostic and hypothesis-free approach. A wide range of environmental data from 12 sources were collected, harmonized, integrated, and spatiotemporally linked to the women based on their geocoded residential address and pregnancy period. A total of 5,510 factors were collected, harmonized, integrated, and spatiotemporally linked to the women based on their geocoded residential address and pregnancy period. A total of 5,510 factors were included in the analysis. A random 50:50 split divided the data into training and testing sets.

Environmental factors were individually examined after adjusting for age, race/ethnicity, education, marital status, WIC (Women, Infants, and Children Nutrition Program) recipient, smoking during pregnancy, pre-pregnancy BMI, parity, season, and year of conception. Mixed-effects models were used to account for the multilevel structure. A factor is deemed as “significant” if it has a false discovery rate-adjusted p-value (or q-value)<0.01 in the training set and a p-value<0.01 in the testing set. We identified 1,208 factors significantly associated with HDP, with strong associations observed between HDP and three categories of environmental factors: 1) neighborhood social capital (i.e. ZIP Code-level density of fitness and recreational sports centers, OR per standard deviation increase [OR_{sd}]: 0.34, 99% CI: 0.25, 0.46), 2) food access (i.e. low access tract at 10
EWAS is a promising approach to identify novel environmental factors associated with cardiovascular diseases. Environmental exposures appear to play a critical role, both in identifications of pregnant women at increased risk of HDP and in determinations of potential target for public health interventions.


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Funding Component: National Center

P101

Neighborhood Walkability and Risk of Hypertension

Alana Jones, UAB, Birmingham, AL; Natalie Colabianchi, Univ of Michigan, Ann Arbor, MI; Virginia Howard, George Howard, Ryan Irvin, Ninad Chaudhary, Suzanne E Judd, UAB, Birmingham, AL

Introduction: Over the past decade, studies on associations between built environments and health outcomes have exponentially increased, particularly regarding walkability. Some studies have shown associations between walkability and lower blood pressure, as well as other cardiometabolic risk factors. Objective: The purpose of this study was to investigate associations between objectively measured neighborhood walkability and incidence of hypertension in older adults in a national cohort study in the United States. Methods: Neighborhood walkability was measured by Walk Score, and scores were generated for participants in the Reasons for Geographical and Racial Differences in Stroke Study (REGARDS, n=30,172). Descriptive statistics were reported by the categories of Walk Score: Car-Dependent, Somewhat Walkable, Very Walkable, and Walker's Paradise. Associations between walkability and blood pressure were tested both cross-sectionally and longitudinally. Covariates included age, race, sex, geographical region, income, education, health behaviors (i.e., smoking, alcohol use, exercise), and cardiovascular comorbidities (i.e., dyslipidemia, diabetes). Linear models tested associations between Walk Score and systolic and diastolic blood pressure. Logistic regression models tested associations between Walk Score and incident, prevalent, and treated hypertension. Results: In adjusted analyses, Walk Score category was not associated with incident hypertension in the entire cohort. However, among white participants, a higher Walk Score category was associated with a lower odds of incident hypertension. In secondary analyses, higher Walk Score category was associated with lower odds of treated hypertension (OR 0.87, 95% CI 0.78-0.97, p=0.03). Higher Walk Score was linearly associated with higher diastolic blood pressure cross-sectionally in black participants but not among the entire cohort (P-interaction=0.02). Conclusions: We found limited evidence that higher walkability was an important contributor to hypertension. Further studies are needed to understand the associations between walkability and cardiovascular health outcomes. A better understanding of the relationship between residential features and hypertension could potentially help redefine intervention strategies for cardiovascular disease risk reduction.

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Funding Component:
Air Pollution, Traffic Noise and Development of Subclinical Atherosclerosis in the Thoracic Aorta

Barbara Hoffmann, Frauke Hennig, Univ Düsseldorf, Düsseldorf, Germany; Henrike Geisel, Univ Duisburg-Essen, Essen, Germany; Sarah Lucht, Univ Düsseldorf, Düsseldorf, Germany; Susanne Moebus, Raimund Erbel, Karl-Heinz Jöckel, Univ Duisburg-Essen, Essen, Germany; André Scherag, Univ Jena, Jena, Germany; Hagen Kälsch, Alfried Krupp Hosp Essen, Essen, Germany

Background Air pollution and noise are suggested to be related to subclinical atherosclerosis, but evidence is scarce and inconsistent. We investigated the independent associations and interactions of long-term exposure to air pollution and road traffic noise with development and progression of thoracic aortic calcification (TAC).

Methods We used baseline (2000-2003) and follow-up (2006-2008) data from the German Heinz Nixdorf Recall Study, a population-based cohort of 4,814 randomly selected participants. We assessed residential long-term exposure to air pollution and noise with chemistry transport and noise propagation models, respectively. TAC was quantified from non-contrast enhanced electron beam computed tomography. Incident TAC and percent increase in TAC progression were analyzed with multiple logistic and linear regression, respectively, adjusted for age, sex, lifestyle variables, and individual and area-level socioeconomic status.

Results The analysis sample comprised 3,125 participants (mean age 59.4 years, 49.9% male) with a mean follow-up of 5 years. Traffic-related air pollutants and night-time noise ($L_{\text{night}}$) were associated with incident TAC (OR 1.18 [95%CI: 0.98-1.41] per IQR of particle number concentration and 1.20 [0.99, 1.46] per 5 dB(A) $L_{\text{night}}$). Similar associations were observed for TAC progression (0.14% [0.00; 0.28%] per IQR of NO$_2$ and 0.18% [0.02; 0.35%] per 5 dB(A) $L_{\text{night}}$), in those with minimal calcification at baseline. Results did not change upon mutual adjustment. Conclusion

Our study suggests that air pollution and road traffic noise may be weakly associated with the development of subclinical atherosclerosis, which remained robust when taking the other exposure into account.


Funding: No

Funding Component: P103

Childhood- and Adult Neighborhood-Level Variation in Adult Metabolic Syndrome Measures

Todd R. Sponholtz, Ramachandran S. Vasan, Boston Univ Sch of Med, Boston, MA

Objectives: Metabolic syndrome (MS) risk varies by residential neighborhood across the life-course. We compared the proportional variance of adult MS measures explained at the level of adult and childhood neighborhoods.

Methods: We defined neighborhoods as groups of Framingham Offspring Cohort (OS) members whose examination 1 (1971-4) residences were geocoded to within 100 m of ≥1 other group member. We included neighborhoods whose residents had ≥5 children in the Generation 3 Cohort (Gen3) aged 0-19 years at the time of their parent’s first examination. Outcomes were measured from 1971-4 for OS and 2002-5 for Gen3; we analyzed residuals of log-transformed body mass index (BMI), systolic blood pressure (SBP), diastolic blood pressure (DBP), and serum high-density lipoprotein (HDL) and -triglycerides, regressed on age and sex. We estimated neighborhood-level intraclass correlations (ICCs) and 95% confidence intervals (95% CIs) of all outcomes using multilevel linear regression.

Results: Among 598 Gen 3 participants (mean...
age 39.8 years, 49.8% men), parental-residence-defined childhood neighborhoods (n=58) explained 6.6% (95% CI: 2.3, 15.5%) and 6.0% (95% CI: 2.1, 15.9%) of the variance in HDL and triglyceride levels, respectively. The neighborhood-level ICC for BMI was 2.4% (95% CI: 0.5, 11.9%); ICCs for blood pressure measures were similar to BMI. Neighborhoods explained none of the variance in any outcome among 772 OS participants (mean age 38.0 years, 49.2% men).

Conclusion: Childhood, but not adult, neighborhoods explained a modest percentage of the variance in adult MS measures.

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P104

Impact of Cold Weather on Cardiovascular Diseases in Texas

Kai Zhang, Tsun-Hsuan Chen, The Univ of Texas Health Science Ctr at Houston, Houston, TX

Background: Cardiovascular disease (CVD) has been estimated to account for nearly 50% of total deaths during cold seasons, and cold weather has been shown to have a significant impact on CVD. More importantly, detrimental health effects of cold were particularly pronounced in regions with mild winter climate. Texas is the second largest state in the U.S. and is associated with varying climates. This study aims to improve the understanding of how cold weather affects CVD-related mortality and morbidity in Texas. Methods: We obtained mortality data (1990-2013) and emergency hospital admissions (EHA) data (2003-2014) from the Texas Department of State Health Services and weather data from the National Climate Data Center. Our analysis included cases diagnosed as cardiovascular disease (CVD, ICD-9 390-429; ICD-10 I01-I52), ischemic heart disease (IHD, ICD-9 410-414; ICD-10 I20-I52), myocardial infarction disease (MI, ICD-9 410; ICD-10 I21, I22) and stroke (ICD-9 430-438; ICD-10 I60-I69). We first applied Poisson regression models to 12 Texas major Metropolitan Areas (MSAs) to estimate cold effects on deaths and hospital admissions related to CVDs. A random effects meta-regression analysis was then used to estimate pooled effects for the entire state.

Results: With a 1°C decrease in temperature below a MSA-specific threshold, increased death risks were observed in CVDs (1.8% [95%CI: 1.1%, 2.6%]), stroke (1.2% [95%CI: -0.2%, 2.6%]), IHD 2.5% [95%CI: 1.1%, 4.0%], and MI 4.3% [95%CI: 1.2%, 7.5%]). Estimates of cold effects were lower for EHA risks, and they were 1.1% (95%CI: 0.4%, 1.8%) for CVDs, 2.3% (95%CI: -0.3%, 4.9%) for stroke, 1.7% (95%CI: -0.1%, 3.6%) for IHD, and 0.3% (95%CI: -3.5%, 4.2%) for MI. Conclusion: This is the first multi-city study in the U.S. that examined the effect of cold weather on CVD using both mortality and hospital admission data. Cold weather increases mortality risk significantly but less in EHA risk in Texas, and effects vary geographically. Our findings can provide insights to design better intervention strategies for targeted vulnerable populations towards reducing adverse health effects of cold weather.

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P105

Less Walkable Neighborhoods Are Associated With Worse Cardiovascular Risk Profile

Nicholas Araki Howell, Jack V Tu, Rahim Moineddin, Univ of Toronto, Toronto, ON, Canada; Anna Chu, ICES, Toronto, ON, Canada; Gillian L Booth, Univ of Toronto, Toronto, ON, Canada
**Introduction** There is mounting evidence that neighborhoods that have low levels of walkability have higher burdens of cardiovascular disease (CVD) risk factors such as obesity and hypertension. However, few studies have examined the impact of walkability on overall cardiovascular risk.

**Hypothesis** We hypothesized that residents living in less walkable communities have a higher burden of cardiovascular risk factors and a greater predicted risk for future CVD events.

**Methods** We assembled a cross-sectional sample of community dwelling adults aged 40-74 on January 1, 2008 from the CANHEART cohort. We ascertained systolic blood pressure, HDL and total cholesterol, smoking status, and diabetes status using a combination of EMR, clinical laboratory databases, and health administrative databases. The primary outcome was an estimated total 10-year cardiovascular disease risk of ≥ 7.5% using the ACC/AHA Pooled Cohort risk score. Walkability was measured using a validated index and divided into quintiles from lowest (Q1) to highest (Q5). The associations were tested using linear and logistic regression with cluster-robust standard errors, adjusting for confounders.

**Results** In total, 44,448 individuals were included in the analysis. Individuals living in less walkable areas had a higher predicted 10-year CVD risk than those living in highly walkable areas. The association was non-linear, as individuals living in neighborhoods of mid-range walkability (Q3) were even more likely to have an estimated 10-year CVD risk exceeding 7.5% in comparison to those in Q5 (OR = 1.33, (1.23, 1.45)). Conversely, we observed monotonic associations between decreasing walkability and higher mean systolic blood pressure (Q1 vs. Q5: +2.73 mmHg, 95% CI: +2.11, +3.35) and odds of diabetes (Q1 vs. Q5: OR = 1.29, 95% CI: 1.13, 1.47). Dose-response associations were also observed between decreasing walkability and lower HDL cholesterol (Q1 vs. Q5: -1.93 mg/dl, 95% CI: -2.32, -1.16) and likelihood of being a current smoker (Q1 vs. Q5: OR = 0.76, 95% CI: 0.67, 0.85).

**Conclusions** Residents living in less walkable neighborhoods had a higher burden of CVD risk factors and a higher estimated risk of future CVD. Conversely, the likelihood of smoking was higher in more walkable neighborhoods, suggesting this may be an area to focus smoking cessation efforts.

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**P106**

**Genetically Determined Fibrinogen, Gamma Prime Fibrinogen and Risk of Venous Thromboembolism and Ischemic Stroke: Evidence From Mendelian Randomization**

Jillian Maners, Sch of Public Health, Univ of Texas Health Science Ctr at Houston, Houston, TX; Dipender Gill, Imperial Coll London, London, United Kingdom; Nathan Pankratz, Weihong Tang, Univ of Minnesota, Minneapolis, MN; Cohorts for Heart and Aging Research in Genomic Epidemiology (CHARGE) Hemostasis Working Group; INVENT Consortium; MEGASTROKE consortium of the International Stroke Genetics Consortium (ISGC); Nicholas L Smith, Univ of Washington, Seattle, WA; Alanna C Morrison, Sch of Public Health, Univ of Texas Health Science Ctr at Houston, Houston, TX; Abbas Dehghan, Imperial Coll London, London, United Kingdom; Paul S de Vries, Sch of Public Health, Univ of Texas Health Science Ctr at Houston, Houston, TX

**Introduction:** Fibrinogen is a key component of the coagulation cascade, and variation in its circulating levels may contribute to thrombotic diseases, such as venous thromboembolism (VTE) and ischemic stroke.

**Methods:** Two-sample Mendelian randomization (MR) was applied to estimate the causal effect of circulating fibrinogen and its...
isoform, gamma prime fibrinogen, on risk of VTE and ischemic stroke subtypes using summary statistics from published genome-wide association studies of fibrinogen, VTE, and ischemic stroke, and an unpublished study of gamma prime fibrinogen. Genetic instruments for fibrinogen and gamma prime fibrinogen were selected by pruning genome-wide significant variants to linkage disequilibrium $r^2 < 0.1$. The inverse variance weighted MR approach was used to estimate effects in the main analysis, with additional approaches that are more robust to the inclusion of pleiotropic variants applied in sensitivity analyses, including MR-Egger, weighted median MR, and weighted mode MR.

**Results:** The main inverse variance weighted MR estimates (Table) based on 85 genetic instruments for fibrinogen and 27 genetic instruments for gamma prime fibrinogen indicated a protective effect of both fibrinogen and gamma prime fibrinogen levels on VTE risk. Higher fibrinogen levels decreased the risk of cardioembolic stroke but increased the risk of large artery and small vessel stroke. Higher gamma prime fibrinogen levels decreased the risk of all ischemic stroke, cardioembolic stroke, and large artery stroke. Effect estimates were consistent across sensitivity analyses, indicating that the results are unlikely to be attributable to the inclusion of pleiotropic variants.

**Conclusion:** Our results are consistent with effects of genetically determined fibrinogen and gamma prime fibrinogen on VTE and ischemic stroke. The identified protective effects may reflect the diverse roles of the fibrinogen, beyond the formation of fibrin clots, in thrombotic diseases with different etiologies.

<table>
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<tr>
<th>Table: Inverse variance weighted Mendelian randomization effect estimates of genetically determined fibrinogen and gamma prime fibrinogen levels on thrombotic diseases.</th>
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<tbody>
<tr>
<td><strong>Fibrinogen</strong></td>
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<tr>
<td>Odds ratio (95% confidence interval)</td>
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<tr>
<td>Venous thromboembolism</td>
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<tr>
<td>All ischemic stroke</td>
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<tr>
<td>Cardioembolic stroke</td>
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<td>Large artery stroke</td>
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<td>Small vessel stroke</td>
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*The log10/L-increase in genetically determined circulating fibrinogen/gamma prime fibrinogen levels.*

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**P107**

**Thirty-Year Risk of Incident and Recurrent Ischemic Stroke in Individuals With Sickle Cell Trait and Modification by Midlife Risk Factors: The Atherosclerosis Risk in Communities Study**

**Melissa C. Caughey,** Vimal K. Derebail, Nigel S. Key, Univ of North Carolina, Chapel Hill, NC; Alexander P. Reiner, Univ of Washington, Seattle, WA; Rebecca F. Gottesman, Johns Hopkins Univ, Baltimore, MD; Abhijit V. Kshirsagar, Gerardo Heiss, Univ of North Carolina, Chapel Hill, NC

**Introduction:** Sickle cell trait (SCT) has been associated with ischemic stroke in some, but not all, epidemiologic cohorts. Heterogeneity of the association may be related to differences in demographic subgroups or midlife risk factors.

**Methods:** The ARIC study is an observational cohort based on 4 US communities. Participation has included 6 clinical visits and ongoing surveillance of acute cardiovascular events. Black participants were genotyped for SCT, excluding any with sickle cell anemia or hemoglobin SC disease. Global genetic ancestry was determined from whole genome variation. Midlife factors were ascertained at ARIC visit 1 (1987-1989), or if missing imputed from visit 2 (1990-1992). Acute ischemic stroke was classified by physician review of the medical record. Associations between SCT and ischemic stroke were analyzed using repeat-events Cox regression with robust estimators, counting all occurrences of ischemic stroke per participant. Models were adjusted for sex, age, global genetic ancestry, and midlife factors (smoking,
hypertension, hyperlipidemia, diabetes, chronic kidney disease, and previous myocardial infarction). Effect modification was tested by the multiplicative interaction of SCT with each midlife factor. **Results:** Our population was composed of 3,827 black adults with complete midlife data (32 [0.8%] excluded). SCT was identified in 255 (7%). The mean age at visit 1 was 53 years; the median follow-up time was 26 years. Most (63%) were women. At midlife, individuals with SCT had a greater prevalence of hyperlipidemia (32% vs. 26%; *P* = 0.04) and chronic kidney disease (20% vs. 13%; *P* = 0.003). From 1987-2016, 579 ischemic strokes occurred in 456 individuals. SCT was more strongly associated with ischemic stroke in participants with chronic kidney disease [HR=2.01 (1.13 - 3.60)] than those without [HR=1.10 (0.77 - 1.57)], *P* for interaction = 0.05, **Figure 1.** **Conclusions:** The association between SCT and ischemic stroke is heterogeneous and appears to be stronger in those with chronic kidney disease.

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**Funding Component:** P108

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**Wnt Pathway Gene Expression is Associated With Greater Arterial Stiffness**

Allison L Kuipers, Emma Barinas-Mitchell, Cara S Nestlerode, Univ of Pittsburgh, Pittsburgh, PA; Victor W Wheeler, Tobago Health Studies Office, Scarborough, Trinidad and Tobago; Iva Miljkovic, Joseph M Zmuda, Univ of Pittsburgh, Pittsburgh, PA

The wingless (Wnt) pathway is known to regulate many systems, including embryonic development, bone mineralization, and cancer. Now there is emerging evidence from Basic and our own Population research that Wnt pathway activation is associated with cardiovascular disease (CVD) pathologies, including atherosclerosis and arterial stiffening. However, research on this association in humans is still under-studied and limited in scope. As such, we aimed to survey the entire Wnt signaling pathway for association with subclinical CVD, using a custom gene expression panel (Nanostring, Seattle, WA) of 43 Wnt genes with previous Basic research evidence for a role in vascular disease. We ran this panel in stabilized peripheral blood RNA from 369 African Ancestry men in the Tobago Health Study (mean age 64 years, range 51-89 years). Subclinical CVD assessments were completed at the same study visit as the blood draw, including: arterial stiffness measured by brachial-ankle pulse-wave velocity; atherosclerosis measures of carotid plaque and intima-media thickness via B-mode ultrasonography; and vascular calcification measured by computed tomography in the chest (coronary) and abdomen (aorta). Gene expression was measured in counts per sample, was normalized to housekeeping genes, and the background signal was subtracted. All gene expression and outcome measures were transformed to normality after excluding any extreme outliers. Fourteen Wnt genes showed variable expression in our sample and were tested individually as predictors of subclinical CVD using multiple linear or logistic regression, as appropriate. A conservative Bonferroni-
corrected alpha (0.05/14 genes = 0.0036) was used to account for multiple comparisons in unadjusted models. Associations passing this threshold were then adjusted for common CVD risk factors including age, height, weight, hypertension, pulse, diabetes, smoking, alcohol intake, and sedentary lifestyle. After full adjustment, expression of APC, WNT signaling pathway regulator (APC) and transcription factor 4 (TCF4) showed significant association with arterial stiffness (P=0.012 for both). When entered into a single model (Spearman r=0.14, P=0.007), APC and TCF4 expression were independently associated with arterial stiffness (P=0.004 for both), such that higher expression of APC, but lower expression of TCF4, was associated with greater arterial stiffness. No other tested genes or subclinical CVD measures passed both the conservative unadjusted alpha level and the full model adjustment. This study represents the first test of the association between broad Wnt signaling pathway gene expression and subclinical CVD. While APC and TCF4 have shown some association with vascular pathologies in Basic research, this is the first study to establish the association of their expression with human arterial stiffness.


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Funding Component:

P109

Genetic Correlates of Resilience Among African American Families From the Jackson Heart Study

La'Shaunta' Glover, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Mario Sims, Univ of Mississippi, Jackson, MS; Kari North, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Keith Norris, Univ of California-Los Angeles, Los Angeles, CA; Jennifer Smith, Univ of Michigan, Ann Arbor, MI; Jacquelyn Taylor, New York Univ, New York, NY; Abanish Singh, Duke Univ, Durham, NC; Solomon Musani, Univ of Mississippi Medical Ctr, Jackson, MS

Background: Research has reported that measures of resilience, such as optimism, social support, and religious coping are positively associated with longevity, but there are limited studies on the genetic contribution of resilience among African Americans. Utilizing Jackson Heart Study (JHS) data, we examined the heritability estimates of markers of resilience and their association with proportion of West African genetic ancestry (pAfr) in order to understand familial patterns of resilience among African Americans. Hypothesis: We hypothesized that genetic variation would contribute significantly to variation in indicators of resilience, and that pAfr will be positively associated with greater resilience in African Americans. Methods: Resilience measures (optimism, social support, social networks, religious experiences, and religious practices and coping) were obtained from validated questionnaires. Scores were created for each resilience measure and then all measures were summed to create a total resilience score among 1,200 related and 1,456 unrelated individuals of the JHS cohort. We then analyzed the subset of related individuals to estimate polygenic heritability for resilience measures using Sequential Oligogenic Linkage Analysis Routines (SOLAR), and evaluated the subset of unrelated participants for the association between resilience and pAfr using a multiple linear regression model. The pAfr was estimated from more than 1,400 ancestry informative markers that differentiate West African genetic ancestry from European ancestry using HAPMIX genetic software. In both analyses, we controlled for age, sex, age-by-sex interaction, education, physical activity, smoking and depressive symptoms. Results: In related individuals, we found a significant proportion of variation (h²±SE; p-value) due to familial correlation on religious practices and
coping (0.15±0.09; p=0.0371); religious experience (0.26±0.09; p<0.001); social networks (0.32±0.07; p<0.001); and optimism (0.21±0.08; p<0.001). Heritability estimates for total resilience and social support were not significant. In the subset of unrelated individuals, we found that pAfr was significantly associated (beta±SE; p-value) with total resilience (3.08±1.44; p=0.0327), religious experience (5.16±2.55; p=0.0437), and religious practices and coping (3.77±1.23; p=0.0023) in men but not in women. **Conclusion:** In this sample of African Americans, we found evidence that variation in markers of resilience are influenced by genetic ancestry and sex. West African genetic background was associated with markers of resilience in men only. Due to lack of household effects we could not account for influence of the common environment, which is a limitation of these findings. However, because we found genetic influences of resilience, future studies that explore associations with longevity loci are warranted.

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**Funding Component:**

**P110**

**Early-Life Exposure to Severe Famine is Associated With Higher Methylation Level in the IGF2 Gene and Higher Total Cholesterol in Late Adulthood: The Genomic Research of the Chinese Great Famine (GRECF) Study**

Luqi Shen, Changwei Li, Univ of Georiga, Athens, GA; Zhenghe Wang, Peking Univ Health Science Ctr, Beijing, China; Ruiyuan Zhang, Ye Shen, Toni Miles, Univ of Georiga, Athens, GA; Jingkai Wei, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Zhiyong Zou, Peking Univ Health Science Ctr, Beijing, China

**Objective:** To evaluate association of early-life exposure to the Chinese Great Famine (1959-1961) with DNA methylation in *IGF2*, a gene involved in growth and development, and its subsequent influence on blood lipid levels in late adulthood among participants of the Genomic Research of the Chinese Great Famine (GRECF) study.

**Methods:** The GRECF study recruited 790 participants born between 1956 and 1964 from two neighbor provinces, Anhui and Jiangxi, in China through a multistage, clustered, random sampling. Historically, famine was severe in Anhui and moderate in Jiangxi. Besides individuals born in Anhui province, those who were born during or before the Chinese Great Famine in Jiangxi province and reported having siblings starved to death were also categorized as having severe famine exposure; All other participants born in Jiangxi province were considered as having moderate famine exposure. DNA methylation within the *IGF2* gene locus were assayed using the Sequenom’s MassARRAY system among a random sample of 188 participants. Total cholesterol (TC), low-density lipoprotein cholesterol, and high-density lipoprotein cholesterol were assayed using enzymatic colorimetric tests. Triglycerides was calculated using the Friedman formula and was logarithmically transformed for analyses. Multivariate linear regressions were used to evaluate associations of famine severity with lipids, famine severity with DNA methylation in the *IGF2*, and DNA methylation in the *IGF2* with lipids, respectively, controlling for sex in the base model and additionally controlling for age, education, smoking, and drinking in the fully adjusted model. Mediation analysis was applied to assess the mediation effect of DNA methylation at the *IGF2* gene on the association between early-life exposure to severe famine and adult lipids levels.

**Results:** DNA methylation was quantified at 8 cytosine-phosphate-guanine dinucleotides (CpG) sites in the *IGF2* gene. Exposure to severe famine was associated with higher methylation level at one site of the *IGF2* gene (CpG1: $\beta=0.07$, $P=5.00\times10^{-4}$) and increased levels of TC ($\beta=0.85$;
Furthermore, per unit increase in methylation of the CpG1 site was associated with 1.13-unit increase in TC ($P=0.02$). After further adjustment for all covariates, these associations were still significant ($P_{\text{famine-CpG1}}=0.03$; $P_{\text{famine-TC}}=7.55\times10^{-6}$; $P_{\text{CpG1-TC}}=0.05$). Methylation of the CpG1 site mediated 6% ($P=0.18$) of the association between exposure to the severe Chinese Great Famine and adult TC.

**Conclusion:** Increased methylation level in the $IGF2$ gene may be a consequence of early-life exposure to severe famine during the Chinese Great Famine and this change was also positively associated with TC in late adulthood.

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P111

**A Mendelian Randomization Study of Alcohol Intake and Ischemic Stroke in a Han Chinese Population**

Mengyao Shi, Tulane Univ, New Orleans, LA; Yonghong Zhang, Soochow Univ, Suzhou, China; Changwei Li, Univ of Georgia, Athens, GA; Aili Wang, Tan Xu, Soochow Univ, Suzhou, China; Xiao Sun, Tulane Univ, New Orleans, LA; Xiaqing Bu, Soochow Univ, Suzhou, China; Jing Chen, Tanika N Kelly, Jiang He, Tulane Univ, New Orleans, LA

**Introduction:** Observational studies have reported inconsistent relationships between alcohol intake and ischemic stroke risk. The $ALDH2$ gene encodes an enzyme critical for alcohol metabolism and can serve as an unconfounded proxy for alcohol intake. The current study examined the association between the $ALDH2$ gene and ischemic stroke among 11,753 Chinese participants.

**Hypothesis:** This study hypothesized that carriers of the $ALDH2$ variant tend to drink less alcohol and thus have lower risk for ischemic stroke.

**Methods:** The discovery stage included 999 ischemic stroke cases and 1,001 controls with no history of atherosclerotic disease. The $ALDH2$ gene was sequenced using the SOLiD 4hq platform. Variants with minor allele count (MAC) >10 were each tested for association with stroke using logistic regression models. Interactions between alcohol intake and $ALDH2$ variants were also tested. Aggregate analysis of rare variants (MAC <20) used the sequence kernel association test. Variants with $P<1\times10^{-4}$ were replicated among 4,724 ischemic stroke cases and 5,029 controls from the China Stroke Project.

**Results:** An interaction of alcohol drinking with the $ALDH2$ rs671 variant, which encodes an inactive aldehyde dehydrogenase isozyme that limits tolerability to alcohol, on ischemic stroke risk was identified using the 2 degree of freedom test ($P=2.77\times10^{-5}$, $3.66\times10^{-11}$, and $1.01\times10^{-15}$ in discovery, replication and joint analyses, respectively). Among drinkers, each copy of the variant allele conferred decreased odds of ischemic stroke, with odds ratios (95% CI) of 0.38 (0.25, 0.60), 0.79 (0.69, 0.91), and 0.74 (0.65, 0.85) in discovery, replication and joint analyses, respectively. While no association between the variant allele and stroke was observed among non-drinkers in the discovery stage [odds ratio (95% CI): 1.00 (0.82, 1.23)], the protective relation persisted among non-drinkers in the replication and joint analyses [odds ratios (95% confidence interval): 0.77 (0.71, 0.84) and 0.80 (0.74, 0.87), respectively]. This inconsistency may have resulted from disparate frequencies of former drinkers included in the non-drinking groups. No additional variants were identified.

**Conclusions:** This large-scale genomic study implicates increased alcohol intake as an etiologically relevant risk factor for ischemic stroke.
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P112

**Prediction of the Development of Aortopathy in Patients With Bicuspid Aortic Valves**

*Bamba Gaye, INSERM U970, Paris, France; Hanna M Björck, Cardiovascular Med Unit, Dept of Med Solna, Karolinska Instt, Stockholm, Sweden; Magalie Ladouceur, Maxime Vignac, INSERM U970, Paris, France; Christian Olsson, Cardiovascular Med Unit, Dept of Med Solna, Karolinska Instt., Stockholm, Sweden; Anders Franco Cereceda, Per Eriksson, Cardiovascular Med Unit, Dept of Med Solna, Karolinska Instt, Stockholm, Sweden*

**Background:** Little is known about the association between bicuspid aortic valves (BAV) and ascending aorta dilatation in the population. We aimed to firstly determine the predictors of aortopathy in BAV patients and secondly to develop a clinical classifier to predict aortopathy in a large group of individuals with bicuspid aortic valve.

**Method:** This study includes 1041 patients (including 545 BAV patients and 506 tricuspid aortic valves (TAV) patients) aged 18 or above with aortic valve disease and/or ascending aorta dilatation but devoid of coronary artery disease and primarily not planned for another concomitant valve surgery. Aortic complications of patients were assessed at baseline. Using automated machine-learning, we applied 10-fold cross-validation logistic regression incorporating multidimensional information (i.e., valvular dysfunction, valves morphology, blood sampling, genetic data, clinical data, family history of cardiovascular diseases, prevalent diseases data, demographic characteristics, lifestyle habits data and medication).

**Results:** Among the 545 BAV subjects (age 64.89 +/- 12 years, 68% men). The prevalence of BAV associated with aneurysm (dilatation) (BAV-D) and without aneurysm (BAV-ND) was 54.9% and 45.1% (p<0.001), respectively. Comparing BAV-D and BAV-ND, significant differences in valvular dysfunction pattern were noted, with aortic stenosis predominating in BAV patients without aneurysm (79.3% vs. 68.7% in BAV with aneurysm; p=0.007), and aortic regurgitation in BAV patients with aneurysm (33.7% vs. 25.1% in BAV patients without aneurysm; p =0.03). No differences in age, prevalence of male sex and BMI were observed between BAV-D and BAV-ND Our descriptive analysis showed several patterns of significantly differently associated traits, between undilated and dilated BAV patients (i.e, blood pressure, hypertension, body surface area, height, high-sensitivity CRP, sibling history of myocardial infarction and mother history of myocardial infarction before 65 years, low density lipoprotein (LDL), prevalent MI, prevalent diabetes and prevalent stroke, BAV phenotype). Our predictive classifier included these traits and showed sensitivity of 80% specificity of 84%, negative predictive value of 76%, and positive predictive value of 82% to predict BAV individuals who are of a high risk of developing aneurysm. All these analyses were also performed in TAV patients and showed different patterns of aneurysm manifestation compared to BAV patients

**Conclusion:** Our findings raise the issue of how to implement prevention of aortopathy in BAV patients in a clinical setting and suggest/demonstrated that cardiovascular risk profiles appear to be more predictive than valve morphology, genetic data and circulating plasma proteins.

The prevalence of type 2 diabetes (T2D) in children has risen dramatically. NHANES data of 12-19 years old showed a significant increase, from 9% to 23%, in pre-diabetes and diabetes from 1999-2008, which was related to increases in BMI. Lifestyle interventions in adults have been shown to be effective at reducing T2D risk, however, interventions in families have been inconclusive in demonstrating the benefit of lifestyle change in reducing T2D risk. We hypothesized that using child’s genetic risk information in families at high risk of developing T2D would serve as a motivator to improve behaviors related to risk factors for T2D. We conducted a pilot study of 44 families and their children aged 2-8 who consented to participate in baseline, risk-disclosure and 3-month follow-up sessions. We identified families as high risk based on a maternal history of gestational diabetes, large for gestational age, or paternal obesity. Parents were surveyed on their family’s physical activity and dietary behaviors, and attitudes and motivations for lifestyle change at baseline and 3-month follow-up. At baseline, saliva samples were collected from children for genotyping of variants previously associated with obesity and T2D risk in genome-wide association studies. When genotyping was completed families were then scheduled to receive results. Parents completed questionnaires related to their anxiety (STAI-State) and depressive symptoms (POMS) prior to receiving their child’s genetic risk and immediately after the intervention. Parents received their child’s genetic risk report, in combination with a quasi-motivational interviewing session and educational materials. At the end of the session parents set individualized behavior goals for themselves and their children based on their responses to baseline questionnaires related to dietary and PA behaviors. Follow-up at 3 months are still being collected. Results from the risk disclosure session are reported here. Parents were 35±5 years old; 11% Latino, 26% black and 63% White; and 60% were mothers. Parents reported a significant increase in fatigue (β =0.98, p=0.001), depressiveness (β=0.35, p=0.04), and anxiety (β =3.0, p=0.001) from pre-risk disclosure compared to post risk-disclosure. Parents reported a significant increase in their confidence to change their family’s behaviors after receiving the intervention (β=0.34, p=0.001). All parents committed to a personalized health behavior change after learning of their child’s risk. In conclusion, we were able to demonstrate that genetic risk may be a useful motivator to encourage parents to take immediate action to make improvements to their family’s health behaviors. Short-term follow-up results will determine whether changes were meaningful in actual behavior changes.

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Affiliated Luohu Hosp of Shenzhen Univ Health Science Ctr, Shenzhen, China; Yang Zhao, Bingyuan Wang, Yongcheng Ren, Xuejiao Liu, Dechen Liu, Feiyan Liu, Xu Chen, Leilei Liu, Cheng Cheng, Qionggui Zhou, Guangdong Key Lab for Genome Stability & Disease Prevention, Shenzhen Univ Health Science Ctr, Shenzhen, China; Changwei Li, Univ of Georgia, Athens, GA; Dongsheng Hu, Ming Zhang, Guangdong Key Lab for Genome Stability & Disease Prevention, Shenzhen Univ Health Science Ctr, Shenzhen, China

Aims: CD36, an important gene involved in cholesterol and fatty acid metabolism, has been associated with many metabolic-related traits, including diabetes, hypertension, and obesity in different populations. However, the association of this gene with metabolic syndrome (MS) has not been well-studied. We aimed to investigate the association of CD36 with the risk of MS and longitudinal changes of its components in among participants of the Rural Chinese Cohort Study (RCCS).

Materials and Methods: The RCCS enrolled 20,194 participants aged ≥18 years old between July of 2007 and August of 2008. A total of 17,265 participants (response rate 85.5%) were examined in the follow-up survey between July of 2013 and October of 2014. During the six years, 729 new incident cases of MS were ascertained. We conducted a nested case-control study within the RCCS. Specifically, 408 MS randomly cases and 408 one-to-one matched controls were included in the current study. In addition to follow-up time, non-MS controls were matched to MS cases on age, gender, marital status, and residence village. Human genomic DNA was extracted using a standard method from blood samples collected at the baseline. After quality control, 4 single nucleotide polymorphisms (SNPs) within the CD36 were successfully genotyped. MS was defined according to the 2009 criteria proposed by IDF and AHA/NHLBI. Multivariate conditional logistic regression was used to determine additive associations of SNPs and SNP-haplotype with MS adjusting for body mass index (BMI), smoking, drinking, and physical activity at baseline. Multivariate linear regression models were conducted among the control group to examine association of SNPs and SNP-haplotypes with MS components, controlling for age, gender, BMI, smoking, drinking and physical activity. Multiple testing was corrected by false positive discovery rate (FDR) method.

Results: Two SNPs, rs7755 and rs1049673, were associated with risk for MS. Per minor allele increase in rs7755 and rs1049673 was associated with 2.29 (95% confidence interval [CI]: 1.24-4.24, p=0.008) and 2.30 (95% CI: 1.24-4.26, p=0.008) times higher odds of MS, respectively. In addition, rs1194197 was associated with changes of triglycerides level (β=0.151, p=0.014), and rs7755 (β=0.065, p=0.028) and rs1049673 (β=-0.067, p=0.025) were associated with changes of high density lipoprotein cholesterol in the control group. One haplotype of the four SNPs, AGAG, was associated with the change of waist circumference (β=-1.773, p=0.048).

Conclusions: We identified important SNPs and SNP-haplotypes of the CD36 associated with MS and changes of MS components in a Han Chinese population.


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P115

Prevalence of Undiagnosed Diabetes Decreases by Eighty Percent When A1C Replaces the OGTT: The Africans in America Study
Introduction: Africa has the highest prevalence of undiagnosed diabetes (DM) in the world. It is unknown whether programs designed to screen for DM in Africa should rely on hemoglobin A1C (A1C) or the 2h oral glucose tolerance test (OGTT). In general, the prevalence of undiagnosed DM is lower when detection is based on A1C rather than the OGTT. However, the degree to which the prevalence of undiagnosed DM would be lower in Africans if A1C rather than the OGTT was used is unknown. Heterozygous hemoglobinopathies such as sickle cell trait (SCT) and hemoglobin C (HbC) trait may lower A1C independent of the degree of glycemia, potentially compromising the ability of A1C to detect DM.

Objective: Our goals were to determine in Africans the rate of detection and reproducibility of the diagnosis of DM by both A1C and OGTT.

Methods: Ninety African-born blacks (66% (59/90) male, age 40±11y (mean±SD), BMI 27.6±4.6 kg/m²) who self-identified as healthy, currently live in the Washington DC area and enrolled in the Africans in America study had two OGTT performed 10±8 days apart. At both visits A1C was assayed by HPLC from whole blood and glucose from plasma samples taken at -15, 0, 30, 60, 90 and 120 minutes. For A1C, DM was diagnosed by levels ≥6.5%. For the OGTT, fasting glucose ≥126 mg/dL or 2h glucose≥200 mg/dL was required to diagnose DM. The κ-statistic was used to evaluate reproducibility. Hemoglobin electrophoresis was performed.

Results: At Visit 1: DM was diagnosed by A1C in 4% (4/90) and by OGTT in 26% (23/90). At Visit 2: DM was diagnosed by A1C in 3% (3/89) and by OGTT in 21% (19/90). Diagnosis by A1C and OGTT displayed substantial (κ=0.74) and almost perfect (κ=0.88) reproducibility, respectively. All persons with DM diagnosed by A1C criteria at either visit were also diagnosed by OGTT. However, 83% (19/23) of people with DM diagnosed by OGTT were not detected by A1C. In the entire cohort the combined prevalence of HbS and HbC trait was 14% (13/90). However, the prevalence of SCT and HbC trait in people with DM diagnosed by OGTT was 42% (8/19), but no one with SCT or HbC trait had an A1C level≥6.5%. Conclusion: Diagnosis of DM by both A1C and OGTT are highly reproducible in African immigrants. However, A1C detects 80% fewer people with DM than does the glucose criteria for the OGTT. The clinical consequences of this lower rate of detection of DM by A1C remains to be determined in prospective studies.
Objective: By performing two OGTT in African-born blacks living in the Washington DC area, our goal was to evaluate the reproducibility of: a) the glucose tolerance category b) time to glucose peak, c) shape of glucose curve, d) glucose concentration at 60 minutes. Methods: The participants were 90 African-born blacks (66% male (59/90), age 40±11y (mean±SD), BMI 27.6±4.6 kg/m²), who self-identified as healthy and were enrolled in the Africans in America cohort. Two OGTT were performed 10±8 days apart. At each OGTT plasma samples were taken at -15, 0, 30, 60, 90 and 120 minutes. Diabetes (DM), prediabetes (pre-DM) and normal glucose tolerance (NGT) was defined by ADA guidelines for glucose. The shape of the glucose curve was characterized as monophasic, biphasic or indeterminate. During the OGTT, glucose at 60 minutes ≥ 155 mg/dL was defined as elevated. The κ-statistic was used to evaluate reproducibility (slight 0.00 to 0.20, fair 0.21 to 0.40; substantial 0.61 to 0.80, excellent 0.81 to 1.0). Results: At OGTT-1, DM, pre-DM and NGT occurred in 26% (23/90), 27% (24/90) and 48% (43/90), resp. At OGTT-2, DM, pre-DM and NGT occurred in 21% (19/90), 28% (25/90) and 51% (46/90) resp. Reproducibility for the diagnosis of glucose tolerance status (NGT, pre-DM, or DM) was just substantial (κ=0.66). However, reproducibility for the diagnosis of diabetes (DM or no DM) was excellent (κ=0.88). Furthermore, no one without DM at OGTT-1 was identified as having DM at OGTT-2. The reproducibility of time to glucose peak was only fair (κ=0.32), but 100% of participants with DM had peak glucose after 30 min. Similarly, the shape of the glucose curve had fair reproducibility (κ=0.21), but no one with DM had a biphasic curve. For elevated 60 min glucose, reproducibility was substantial (κ=0.62) and 96% (22/23) of the participants with DM had elevated glucose at 60 min. Conclusion: When duplicate OGTT were performed in Africans, the diagnosis of DM and the morphology of the glucose curves were highly reproducible.


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P117

Prediction of Undiagnosed Diabetes in Africans is Optimized by Using Fasting Plasma Glucose at a Threshold of 100 mg/dL: The Africans in America Study

Margrethe F Horlyck-Romanovsky, Regine Mugeni, Jessica Y. Aduwo, Sara M. Briker, Christopher Dubose, Lilian S Mabundo, Stephanie Chung, Joon Ha, Arthur Sherman, Anne E. Sumner, NIDDK, Bethesda, MD

Introduction and Objectives: Detecting undiagnosed diabetes is the first step towards addressing the diabetes epidemic in Africa. Although there is little experience with diabetes prediction equations in Africans, the A1C-modified Atherosclerosis Risk in Communities (ARIC) diabetes prediction equation was optimized in African Americans. Therefore, we evaluated (a) the ability of the A1C-modified ARIC prediction equation to detect undiagnosed diabetes in African-born blacks living in the United States and (b) the contribution of each biochemical variable to the effectiveness of the equation. Methods: Participants were 400 self-identified healthy African-born blacks enrolled in the Africans in America study (age 38 ±10 (mean ±SD) years, BMI 27.5 ±4.5, range 18.2-42.4 kg/m²). Glucose tolerance status was diagnosed by glucose criteria for the OGTT. The prediction equation had 9 variables; 5 clinical (age, parent history of diabetes, height, waist circumference, and systolic BP); and 4 biochemical (A1C, fasting plasma glucose (FPG), high density lipoprotein (HDL) and triglycerides (TG)). Area under the receiver operating
characteristic curve (AUC-ROC) predicted discrimination and Youden Index identified optimal cut-points. Four models were tested. Model 1 determined the predictive value of the full equation. Model 2 included the clinical variables and 3 of the 4 biochemical variables at a time. Model 3 included the clinical variables and 1 biochemical variable at a time. Model 4 evaluated the independent prediction by each biochemical variable. **Results:** Diabetes, prediabetes and normal glucose tolerance were detected in 7% (26 of 400), 27% (108 of 400) and 66% (266 of 400), respectively. Model 1 had an AUC-ROC of 0.8. Model 2 with FPG excluded had an AUC-ROC of 0.7. When A1C, HDL or TG were the excluded AUC-ROC increased to >0.8. Model 3 with clinical variables and FPG the AUC-ROC was 0.9. However, when A1C, HDL or TG were included AUC-ROC declined to ≤0.7. In Model 4, FPG as a single predictor had an AUC-ROC of 0.9. In contrast, A1C, HDL or TG as single predictors, all had AUC-ROC ≤0.7. For the prediction of diabetes, the optimal cut-point for FPG was 99 mg/dL (sensitivity 85%, specificity 87%). **Conclusions:** As the prediction of prevalent diabetes by the entire equation and FPG alone were similar, FPG ≥100 mg/dL in Africans may be a sufficient and cost-effective way forward.

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**P118**

**Serious Financial Difficulties Impact Subclinical Cardiovascular Disease Among Mexican Women**

**Kaela Connors,** Mario H Flores-Torres, Natl Inst of Public Health, CDMX, Mexico; Unnur Valdimarsdóttir, Ctr of Public Health Sciences, Univ of Iceland, Reykjavik, Iceland; Ruy Lopez-Ridaura, Natl Inst of Public Health, CDMX, Mexico; Carlos Cantu-Brito, Andres Catzin-Kuhlmann, Natl Inst of Medical Sciences and Nutrition, Mexico City, Mexico; Beatriz Beatriz, Univ of Hawaii, John A. Burns Sch of Med, Honolulu, HI; Martin Lajous, Natl Inst of Public Health, Mexico City, Mexico

**Introduction:** Sudden loss of income has been previously associated to all-cause mortality. Diminished financial resources may result in reduced access to healthcare. On the other hand, the psychological stress associated with economic loss may also affect cardiovascular health through a combination of negative physiological changes and unhealthy lifestyle choices. **Hypothesis:** We hypothesize that serious financial difficulties will increase cardiovascular risk in Mexican women. **Methods:** We categorized 1,764 employed and insured disease-free women from the Mexican Teachers’ Cohort according to their response to ‘Have you ever had serious financial difficulties (for example, not enough money for food or place to live)?’ included in a self-reported instrument on life stressors conducted 2013 and 2016. On the same visit, carotid artery intima-media thickness (IMT) was measured by standardized neurologists on both carotid arteries through ultrasound following international guidelines and log transformed. We defined carotid atherosclerosis as an intima media thickness of ≥0.8mm in either of the carotid arteries or the presence of plaque. We collected data on cofounders (age, site, and socio-economic status calculated based on score of household assets), perceived stress (Perceived Stress Scale-10), and other potential intermediates (body mass index, smoking, hypercholesterolemia, hypertension, and diabetes). We used multivariable linear and logistic regression models to assess the association of serious financial difficulties, IMT, and carotid atherosclerosis. **Results:** The average age of the study
population was 49.4 (SD±5.0) years and 312 (17.8%) women reported exposure to serious financial difficulties as adults. High levels of perceived stress (62.2% vs. 42.5%), obesity (42.0% vs. 36.2%), smoking (9.3% vs. 6.7%), hypercholesterolemia (33.3% vs. 31.7%), and diabetes (10.3% vs. 7.5%) were more common among women with serious financial difficulties relative to women without. Women with serious financial difficulties had 1.7% (95% CI 0.2, 3.3) higher mean IMT than women without after adjusting for potential confounders. The prevalence of carotid atherosclerosis was 26.6% in women who experienced serious financial difficulties and 20.9% in women without such exposure. The multivariable-adjusted odds ratio for carotid atherosclerosis among women with serious financial difficulties was 1.40 (95% CI 1.03, 1.90) relative to women without. Adjusting for potential intermediates did not alter the interpretation of our results.

**Conclusion:** Serious financial difficulties were associated to subclinical cardiovascular disease among employed and insured Mexican women.


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**P119**

**Gap Between Need and Supply for Hypertension Care in Low- and Middle-Income Countries**

**Dinesh Neupane, Yijing Feng, Kunihiro Matsushita, Lawrence J Appel, Welch Ctr for Prevention, Epidemiology and Clinical Res, Johns Hopkins Univ, Baltimore, MD**

**Background:** The ‘Resolve to Saves Lives’ initiative aims to save 100 million lives, in part by improving hypertension control. Since only physicians can prescribe antihypertensive medication in most countries, the scalability of such an initiative will depend on physician capacity. We estimated the # of physician visits needed by hypertensive patients and available capacity in the 20 LMICs with the highest # of hypertensive patients.

**Methods:** Total # of physicians and hypertensive patients were estimated using data from World Bank and World Health Organization (WHO). We estimated a) 3 visits/patient/yr; b) total available visits by physicians in a lower capacity scenario (5000 visits/physician/year) and higher capacity scenario (10000 visits/physician/year); c) physicians could spend 10% of total visits on hypertension care.

**Results:** The Table summarizes need and supply (capacity) of physician visits for hypertension care. In the lower and higher capacity scenarios, 50% and 25% of those countries have a deficit of visits for hypertension care, respectively. Indonesia, Bangladesh, Ethiopia, Thailand, and Congo have a deficit in both scenarios. India has the highest deficit in lower capacity scenario. Indonesia has the highest deficit in higher capacity scenario.

**Conclusion:** The gap between supply and need for physician visits to manage hypertension is substantial in several large LMICs. Even in countries without national-level deficit, substantial intra-country deficits may exist due to patient-physician mismatch in urban-rural areas. Options to fill this gap include increasing # of physicians, increasing fraction of physician time for hypertension care, or task sharing with, e.g., nurses and community health workers. Of these, task sharing seems most practical.
Feasibility of Cardiac Rehabilitation in Resource Limited Settings

Gedion T Ngeno, Duke Univ, Durham, NC; Felix Barasa, Moi Teaching and Referral Hosp, Eldoret, Kenya; Peter S Kussin, Joseph Egger, Duke Univ, Durham, NC; Jemima Kamano, Charity Wambui, Edith Kwobah, Moi Teaching and Referral Hosp, Eldoret, Kenya; Nathan Thielman, Gerald S Bloomfield, Duke Univ, Durham, NC

Background:
Heart failure (HF) is a growing driver of morbidity and mortality worldwide. Cardiac rehabilitation in HF improves functional status, quality of life, and depression. Global access to cardiac rehabilitation remains poor, and adherence rates are low.

Methods:
We implemented and assessed adherence rates associated with two models of cardiac rehabilitation in Western Kenya. One hundred participants with HF were prospectively enrolled. Choice of rehabilitation model was based on participant preference. Twenty-five participants opted to participate in 36 institution-based sessions (IBCR). Thirty-one participants enrolled into home-based sessions (HBCR). HBCR comprised 12 weekly pedometer step targets. Forty-four participants were later enrolled into an observational arm (OA). We hypothesized that participants would adhere to at least 25% of prescribed sessions. We secondarily compared changes in 6-minute walk time distance (6MWTD), depression screening (PHQ9) and quality of life (SF36) scores using a paired t-test.

Results:
The mean age of participants was 51 years, of whom 73 were female. Rehabilitation participants preferred institution based rehabilitation. Both study arms were adherent to the prescribed protocol as shown in figure 1. All study arms demonstrated significant improvement in 6MWTD, PHQ9 and SF36 scores.

Conclusions:
IBCR and HBCR, are feasible rehabilitation models for HF in this setting. Adherence rates attained in both models are higher than those seen in many developed countries. Although our results demonstrate feasibility, future research should focus on methods to further improve adherence as well evaluate efficacy of cardiac rehabilitation in this setting.
Funding Component:

P122

**Intersectional Effects of Racial and Gender Discrimination on Cardiovascular Health Vary Among Black and White Women and Men in the Cardia Study**

**Ganga S. Bey**, Sharina D Person, Catarina Kiefe, UMass Medical Sch, Worcester, MA

**Background** Some evidence suggests an association of perceived racial but not gender discrimination with disparities in cardiovascular health (CVH) among U.S. black women and men. We assessed whether there are race-gender differences in the effects of reporting experiences of racial and gender discrimination simultaneously compared with racial or gender discrimination alone, or no discrimination, on future CVH.

**Methods** Data were from a sample of 3,758 black or white adults in CARDIA, a population-based cohort recruited in Birmingham, AL; Chicago, IL; Minneapolis, MN, and Oakland, CA in 1985-6 (year 0). Racial and gender discrimination were assessed using the Lifetime Discrimination Scale at year 7. CVH at year 30 was evaluated using a 12-point composite outcome modified from the AHA’s Simple 7, with higher scores indicating better health. Multivariable linear regressions evaluated the associations between level of perceived discrimination at year 7 and CVH scores at year 30 stratified by race-gender.

**Results** Reporting racial and gender discrimination in ≥2 settings were 48% (496/1039) of black women, 42% (311/743) of black men, 10% (109/1045) of white women, and 5% (45/931) of white men. Year 30 CVH scores (mean, SD) were 7.9 (1.4), 8.1 (1.6), 8.8 (1.6), and 8.7 (1.3), respectively. Table: Compared with those of their race-gender groups reporting no discrimination, white women reporting gender only saw an adjusted score difference of +0.3 (p=0.04); white men reporting racial only, +0.4 (p=0.02), and both racial and gender, -0.6 (p=0.03).

**Conclusions** Racial and gender discrimination interact in their association with CVH differently for different race-gender groups. While modest, a 1-point decrease in CVH score among white men has been shown to correspond to an ~30% increase in the rate of CVD development. More research is needed to understand why perceived discrimination might better predict CVH for whites than blacks, and which other factors associated with race-gender contribute variability to CVH among these groups.

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P123

**Antihypertensive Medication Use and Hypertension Control Among Hispanic/Latino Adults With Hypertension: Findings From Hispanic Community Health Study/Study of Latinos**

**Jenny S Guadamuz**, David Lee, Martha L Daviglus, Univ of Illinois at Chicago, Chicago, IL; Ramon A Durazo-Arvizu, Loyola Univ Chicago, Chicago, IL; Sylvia Wassertheil-Smoller, Albert Einstein Coll of Med, Bronx, NY; Jorge R Kizer, Albert Einstein Coll of Med and Montefiore Medical Ctr, Bronx, NY; Dima M Qato, Univ of Illinois at Chicago, Chicago, IL

**Background** Despite disparities in hypertension prevalence, treatment, and control by Hispanic/Latino background, there is limited information on the role of antihypertensive use in hypertension control. This study estimated antihypertensive use and hypertension control and examined the association between...
antihypertensive use and hypertension control among Latinos with hypertension.

**Methods** Data from the Hispanic Community Health Study/Study of Latinos, a population-based cohort study, was used to estimate antihypertensive use and hypertension control among Latinos by background, sociodemographic, clinical, and healthcare factors. Hypertension was defined as systolic BP $>$140, diastolic BP $>90$ mm Hg, or self-reported antihypertensive use. Hypertension control was defined as systolic BP $<$140 and diastolic BP $<$90 mm Hg. Antihypertensive use was defined as the use of a diuretic, ACE inhibitor, ARB, β-blocker, CCB, or another antihypertensive in the month prior to study examination. Logistic regressions that examine antihypertensive use and hypertension control were multivariate adjusted. Analyses were limited to Latinos with hypertension in 2014-17 (n=5,354).

**Results** Antihypertensive use was 58.7% overall and was higher among Cubans (67.4%) when compared to individuals of other backgrounds (Mexican 53.4%, Puerto Rican 59.8%, Dominican 56.3%, Central American 52.0%, South American 49.8%, P<0.001). Commonly used antihypertensive classes include ACE inhibitors (28.3%), diuretics (16.7%), β-blockers (18.0%), ARBs (15.7%), and CCBs (13.0%). Use of antihypertensive classes varied by background—e.g., a greater share of Cubans used β-blockers (26.0%) and ARBs (19.2%) and a greater share of Puerto Ricans used CCBs (17.6%). Less than half of Latinos achieved hypertension control (48.6%); with the highest share of control among Mexicans (54.0%; P<0.001). Among Latinos with treated hypertension, 61.5% achieved control. In adjusted analyses, we found that Cubans had higher odds of antihypertensive use compared to Mexicans (OR 1.63 [CI 1.18-2.26], P<0.01). However, Cubans, Dominicans, and Central Americans had reduced odds of control, even after adjusting for antihypertensive use (OR 0.57 [CI 0.43-0.77]; 0.55 [CI 0.39-0.80]; 0.53 [CI 0.39-0.73]; all P<0.01). Antihypertensive use was positively associated with hypertension control in all backgrounds—in stratified analyses, associations were strongest among Central and South Americans and weakest among Puerto Ricans and Dominicans. Multiple antihypertensive use was not associated with control among Latinos with treated hypertension.

**Conclusions** The use of antihypertensives varies in Latino adults with hypertension and is associated with differences in hypertension control. Efforts to increase use of antihypertensives can reduce disparities in hypertension control in the diverse Latino population in the US.


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**P124**

Comparative Evaluation of African Dance versus a Cultural Educational Program in Mitigating Cardiovascular Risk Among REACT! Study Participants

Jacob Kigo Kariuki, Adrian Bermundez, Timothy Kilkelly, Chelsea Stillman, Patrick Donahue, Charles Lwanga, Mihloti Williams, Chrisala Brown, Mariegold Wollam, Kathy Jedrziewski, Kirk Erickson, Univ of Pittsburgh, Pittsburgh, PA

**Background** — Currently, about 50% of African American (AA) adults are affected by cardiovascular disease (CVD) compared to 38.9% of the general US adult population. Physical inactivity, a major risk factor for CVD, plays a key role in perpetuating the disparities, while physical activity and psychosocial interventions are known to be protective. In this study, we did a secondary analysis of the 6-month Rhythm Experience and Africana Culture Trial (REACT!) to compare the impact of moderate physical activity (African dance)
versus an educational control program (culture and health education) in reducing cardiovascular risk. **Methods** — In the REACT! Trial, CVD risk factors including history of smoking and diabetes, body mass index and systolic blood pressure (SBP) were measured using CDC-BRFSS protocols. In this analysis, we used the non-lab based Framingham algorithm to compute pre- and post-intervention absolute CVD risk scores. Chi-square and t test were used to evaluate between group differences in categorical and continuous variables, respectively. **Results** — The 28 REACT! Trial participants (mean age 68 yrs, 93% female) were randomly assigned to either the cultural education control group (13) or African dance intervention group (15). At baseline, both groups had comparable cardiovascular risk profiles, including mean SBP (143 vs 146 mmHg; p=0.80) and absolute CVD risk scores (27 vs 29%; p=0.71). Post-intervention, the control group had a more favorable cardiovascular risk profile compared to the intervention group, with improvements in SBP (136 vs 152 mmHg; p=0.028) and absolute CVD risk scores (24 vs 30%; p=0.175), respectively. **Conclusions** — These data suggest that certain control group characteristics such as social interaction could be potent in lowering SBP compared to moderate physical activity. Possible mechanisms might include the stress-lowering effects of social support and communication in the culture education group.


**Funding**: No

**Funding Component:**

**P125**

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**Decreased Exposures to Residential Segregation**

**Emily M. D'Agostino**, Hersila H. Patel, Eric Hansen, Miami-Dade County Dept of Parks, Recreation and Open Spaces, Miami, FL

**Introduction**: Transportation equity ensures that all citizens benefit from a clean, fair, safe and healthy environment. Residential segregation also impacts health, and transportation disadvantage is particularly high in areas with high segregation, where residents typically lack proximity to quality education, jobs, healthy food, safe playgrounds, and medical care. Recent research demonstrates improvements in cardiovascular risk profiles among minority girls after reduced exposure to segregation. There is a need to examine differences in the segregation-youth cardiovascular health association across transportation vulnerability and gender to inform health equity interventions.

**Hypothesis**: It was hypothesized that girls with reduced segregation exposure and low transportation vulnerability would have the most improved cardiovascular health.

**Methods**: Data for these analyses were drawn from the Fit2Play dataset (2010-2018; N=2742). Youth were followed over 4 consecutive years of participation in a year-long afterschool physical activity program. Change in segregation exposure was based on concentration of minorities living in block groups from the participant’s home to program areas using the 2010 Census. Transportation vulnerability was based on percent of households in the participant’s home zip code with vehicle access (0, 1, 2, or ≥3 vehicles) drawn from the American Community Survey (2012-16). Longitudinal mixed models were used to compare the association between change in residential segregation and five cardiovascular health risk measures (body mass index, systolic and diastolic blood pressure, skinfold thickness and 400 meter run tests) stratified by transportation vulnerability and gender.

**Results**: Participants were 54% male, 51%...
Hispanic, 49% non-Hispanic black, and 52% high poverty (mean age 9.5 years). After accounting for child age, race/ethnicity, poverty, and year, girls with high transportation vulnerability and reduced segregation exposure showed the most reduced cardiovascular health risk profiles, including improvements in body mass index (26%, 95% CI: 23.84, 28.30), skinfold thicknesses (18%, 95% CI: 14.90, 20.46), run time (17%, 95% CI: 14.88, 18.64), systolic blood pressure (15%, 95% CI: 11.96, 17.08), and diastolic blood pressure (12%, 95% CI: 9.09, 14.61). In contrast, no clear patterns emerged for low transportation vulnerable girls, and high or low transportation vulnerable boys.

**Conclusions:** In conclusion, high transportation vulnerable girls exposed to reduced segregation had greater improvements in all cardiovascular health risk outcomes compared with low transportation vulnerable girls, and both high and low transportation vulnerable boys. Transportation equity interventions may provide a means to reduce youth cardiovascular health disparities, particularly for girls living highly segregated areas.

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Funding: No

**Funding Component:**

P126

**The Cardiovascular Health of Afro-Caribbean Immigrants in New York City: a Cross Sectional Study**

**Sabena Thomas,** Amna Umer, West Virginia Univ, Morgantown, WV; Yvonne Commodore-Mensah, John’s Hopkins Sch of Nursing, Baltimore, MD; Sumaira Khalid, Christian Abildso, West Virginia Univ, Morgantown, WV

**Introduction:** Afro-Caribbean (AC) immigrants are the largest black immigrant group in the U.S. and generally display better physical health than United States (U.S.) born blacks. Cardiovascular health (CVH) disparities among AC immigrant sub-groups are poorly understood. We examined the prevalence of CVH factors among AC immigrants (Guyanese, Haitian and Jamaican) relative to U.S. born blacks residing in New York City. We hypothesized that some AC immigrant sub-groups will have higher rates of CVH factors than U.S. born blacks.

**Methods:** We performed a cross-sectional analysis of pooled data from the 2010-2014 New York City Community Health Survey administrations to estimate the prevalence of CVH and differences among AC immigrant sub-groups. We included 7678 non-Hispanic black participants from Haiti (n=291), Jamaica (n=1031), Guyana (n=369) and U.S. born blacks (5987). Logistic regression was used to examine the association between country of birth and CVH factors. The CVH factors were determined from the AHA’s CVH metrics. We adjusted the models for significant covariates using backward sequential selection.

**Results:** In final adjusted models, in comparison to U.S. born blacks, Jamaican immigrants were more likely to self-report diabetes but were less likely to be overweight/obese. Guyanese immigrants were also less likely to be overweight/obese than U.S. born blacks. There were no significant differences between Haitian immigrants and U.S. born blacks for CVH factors.

**Conclusions:** Although AC immigrants depict superior health status compared to U.S. born blacks, ethnic differences exist in CVH among AC immigrant sub-groups. Efforts to address cardiovascular health factors among black populations in the U.S. should consider ethnic differences that may provide information about the most at-risk populations for disease-specific programmatic or policy interventions.
Years of Life Lost Due to Cardiovascular Disease Among Asian American Subgroups, 2003-2012

Divya Iyer, Univ of Connecticut Sch of Med, Farmington, CT; Latha Palaniappan, Stanford Univ Sch of Med, Stanford, CA

Title: Years of life lost due to cardiovascular disease varies among Asian American subgroups, 2003-2012

Introduction: Asian American subgroups (Asian Indian, Chinese, Filipino, Korean, Japanese, and Vietnamese) display significant differences in mortality due to cardiovascular disease. It has previously been proposed that cancer is the leading cause of death for all Asian Americans. However, recent analysis of each individual subgroup reveals that heart disease is actually the leading cause of death for Asian Indian, Filipino and Japanese populations. Additionally, certain Asian American subgroups have an increased burden of risk factors and disease mortality at younger ages when compared to Non-Hispanic Whites.

Years of potential life lost (YPLL) provides a measure of premature mortality due to cardiovascular disease by taking into account race-specific life expectancy and the younger age at death that is specific to Asian American populations.

Hypothesis: We assessed the hypothesis that certain subgroups, such as Asian Indian and Filipino populations, lost more years of life due to cardiovascular disease when compared to other Asian American subgroups and Non-Hispanic Whites.

Methods: We used National Center for Health Statistics Multiple Causes of Death mortality files from 2003-2012. Sample size for Asian Americans was 354,256 and for Non-Hispanic Whites was 19,722,445. We calculated life expectancy, mean YPLL, and YPLL per 100,000 population for each Asian subgroup. We further characterized race-specific life expectancy using linear interpolation, and YPLL per 100,000 was standardized and age-adjusted using age categories.

Results: Asian American subgroups display heterogeneity in cardiovascular disease burden. Asian Indians had a high burden of ischemic heart disease (IHD); Asian Indian men lost a mean of 17 years of life to IHD while Japanese and Non-Hispanic White men lost 14 years of life. Regarding cerebrovascular disease, Vietnamese populations lost a mean of 17 years of life, and Filipino populations lost a mean of 16 years. All Asian subgroups had higher years of life lost to cerebrovascular disease compared to Non-Hispanic Whites.

Conclusion: Cardiovascular disease burden varies among Asian subgroups, and contributes to significant premature mortality in certain populations. Asian Indian and Filipino populations have the highest years of life lost due to ischemic heart disease. Filipino and Vietnamese have the highest years of life lost due to cerebrovascular disease. Mean YPLL due to cardiovascular disease was higher for Asian Indians, Korean, Vietnamese, and Filipino subgroups than mean YPLL for Non-Hispanic Whites. To address these health disparities, an analysis of risk factors is required and subgroup-specific interventions must be developed.

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P128

Statin Prescribing, Switching, and Low-density Lipoprotein Cholesterol Goal Attainment Across Racial/Ethnic Groups With Atherosclerotic Cardiovascular Disease

Robert J Romanelli, Sutter Health, PAMFRI, Palo Alto, CA; Matthew J Ito, Sanofi US, Bridgewater, NJ; Dean G Karalis, Thomas Jefferson Univ Hosp, Philadelphia, PA; Hsiao-Ching Huang, Sutter Health, PAMFRI, Palo Alto, CA; Serban R Iorga, Regeneron, Tarrytown, NY; Ivy Kam, Regeneron Pharmaceuticals, Inc., Tarrytown, NY; Stephen F Thompson, Teva Pharmaceuticals, Parsippany, NJ; Kristen M Azar, Sutter Health, Walnut Creek, CA

Introduction: Statins are effective in reducing low-density lipoprotein cholesterol (LDL-C) and preventing cardiovascular (CV) events in patients with a history of atherosclerotic CV disease (ASCVD), irrespective of race/ethnicity (R/E). Differences in statin utilization, including prescribing and switching, in relationship to LDL-C goal attainment by R/E has not been well studied.

Hypothesis: We expect differences in attaining LDL-C <70 mg/dL (goal) by R/E and that differences in goal attainment are associated with patterns in statin utilization.

Methods: We selected patients ≥40 years of age in the Sutter Health electronic health records (EHR) with ASCVD based on International Classification of Diseases 9/10 diagnoses (2006-2016), with a new statin prescription (defined as no evidence of a statin in the year prior) and LDL-C values. Patient demographics and clinical characteristics at statin initiation (index) were extracted. We examined differences in LDL-C goal attainment after 1-year follow-up (mean ~16 months) from index date by R/E and initial statin intensity (low/moderate [L/MIS] vs. high [HIS]) using logistic regression. Differences in rates of statin intensity increases or decreases were estimated during follow-up by R/E using negative binominal regression. Incident rate ratios (IRR) were calculated. All models were adjusted for demographic and clinical characteristics.

Results: From a database of 3.1 million patients, 241,912 had ASCVD and 11,499 met inclusion criteria (66% non-Hispanic white [NHW], 9% Asian, 3% black, 8% Hispanic, 14% other/unknown). About 18% of patients initiated treatment on HIS and 82% on L/MIS statin, with no significant differences by R/E.

LDL-C goal was attained by 33% of patients, overall, and 42% and 30% on HIS and L/MIS, respectively. Of those on HIS, Asians were more likely to have statin intensity decreases than NHWs (IRR:1.89) but were also more likely to attain LDL-C goal than NHWs (58% vs. 39%). Among those on L/MIS, intensity increases were not different by R/E, yet Asians were still more likely to attain goal than NHWs (38% vs. 30%), whereas black patients were less likely (24%). Hispanics on L/MIS were more likely to have intensity decreases (IRR: 1.44), yet similarly met goal (33%) as compared with NHWs. When included in statistical models, statin intensity increases and decreases were independent predictors of higher and lower odds of goal attainment, respectively, but did not alter relationships between R/E and goal attainment.

Conclusions: In this ASCVD cohort receiving statins, LDL-C goal attainment differed by R/E, and was highest among Asians and lowest among black patients, however this difference in goal attainment does not appear to be related to differences in statin utilization. Other modifiable factors, such as adherence or access to care, need to be investigated further to improve goal attainment across all R/E groups.

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P129

Racial Differences in Cardiovascular Disease Outcomes after Myocardial Infarction: A REGARDS Study

J. Walker Blackston, Tulane Univ, New Orleans, LA; Matthew Mefford, Elizabeth Pruitt, George Howard, Virginia J Howard, Univ of Alabama at Birmingham, Birmingham, AL; Monika Safford, Cornell Univ, New York, NY; David C Naftel, Emily B Levitan, Univ of Alabama at Birmingham, Birmingham, AL

Introduction: Although prognosis following myocardial infarction (MI) has improved overall, it is unclear whether improvements are similar for blacks and whites.

Methods: We followed black and white participants in the REasons for Geographic And Racial Differences in Stroke (REGARDS) study from their first adjudicated MI to first occurrence of a composite CVD endpoint (stroke, MI, CVD death). REGARDS includes 30,239 individuals ≥45 years of age across the US.

Results: We studied 1,056 participants (38% black; 45% female; mean age 73 ± 9 years) with adjudicated MI who survived at least one day. Cox proportional hazards models estimated hazard ratios (HR) and 95% confidence intervals (CI) comparing blacks to whites, adjusting for demographic and pre-MI clinical covariates. Blacks had higher demographic-adjusted rates of CVD after MI compared to whites (HR 1.28, 95% CI 1.08-1.51) which attenuated after full adjustment (HR 1.00, 95% CI 0.89-1.32) for clinical characteristics.

Conclusion: Blacks had higher risk of post-MI CVD than whites, which was explained by pre-MI health status.

Figure 1. Unadjusted=race*CVD; Predisposing factors = age + sex; Need = model 1 + marital status, income, educational attainment, health insurance status, rural or urban residential status; Enabling = model 2 + smoking, BMI, eGFR, ACR (urinary albumin-to-creatinine ratio), diabetes, history of stroke, hypertension; In-hospital = model 3 + peak troponin level, ECG status, heart failure, revascularization


Funding: No

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P130

Disparities in Out-of-hospital Cardiac Arrest Rates Among Adults, Aged ≥18 Years Old, With 9-1-1 Emergency Medical Service Activation’s in the United States, 2016

Isaac Nwaise, Erika C. Odom, CDC, Atlanta, GA
INTRODUCTION. Out-of-hospital cardiac arrest (OHCA) is a significant public health issue.

Hypothesis. This study aims to assess whether patients’ age, sex, race/ethnicity, and urban/non-urban status are associated with the rate of OHCA events among adults who accessed 9-1-1 emergency medical services (EMS) in 2016. METHODS. We conducted a cross-sectional analysis using the 2016 National Emergency Medical Services Information System (NEMSIS), a national EMS database. OHCA events among adults aged ≥18 years were extracted by sex, age group, race/ethnicity, urban and non-Urban categories. Those with unknown race/ethnicity (45.8%) or of other race (1.3%) were excluded. Rates of OHCA events were calculated and Chi-square tests were used to assess associations.

RESULTS. We identified 205,461 OHCA events with EMS activations among non-Hispanic (NH) whites (68.1%), NH blacks (23.2%), and Hispanics (8.7%) in the 2016 NEMSIS dataset. Of the OHCA events, 59.5% were among males, 81.1% among urban residents, and 15.4% among non-urban residents. The overall OHCA rate was 19.6 per 1,000 EMS activations. OHCA rates per 1,000 EMS activations increased with age for adults until age 74, ranging from 11.2 (18-34 years) to 25.1 (65-74 years), then decreased with age for older adults ≥75 ranging from 22.3 (75-84 years) to 20.8 (≥85 years) (p<.0001). OHCA rates were higher among males 25.3, Hispanics 20.9, and urban residents 21.7 than females 15.6, other race ethnicities (NH whites 19.8 and NH blacks 18.7), and non-urban residents 17.6 (p<.0001) respectively.

CONCLUSIONS. OHCA incidence rates among EMS activations increased with age until age 74. Adult males, Hispanics, and urban patients had statistically significant higher EMS activations for OHCA rates. Findings can be incorporated in community planning for improving EMS services.

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P131

Sex Specific Patterns of Heart Rate Variability Following Acute Coronary Syndrome Do Not Drive 2-Year Hospital Readmission Outcomes

Adrienne Oneil, Anna J Scovelle, Univ of Melbourne, Carlton, Australia; C. Barr Taylor, Stanford and Palo Alto Universities, Palo Alto, CA; David L Hare, Emma Thomas, Samia Toukhsati, Univ of Melbourne, Carlton, Australia; John Oldroyd, Monash Univ, Prahran, Australia; Brian Oldenburg, Univ of Melbourne, Carlton, Australia

Introduction: Women experience poorer clinical outcomes after Acute Coronary Syndrome (ACS). While the reason for this differential is unclear, autonomic function -indicative of vagal and sympathetic modulation directed to the sinus node- is a candidate mechanism.

Hypothesis: That sex-specific differences in heart rate variability (HRV) in the year following ACS drive all-cause readmission outcomes after 2-years. Methods: 416 ACS patients were enrolled in the ADVENT longitudinal cohort study after admission to a large cardiology hospital (January 2013 to June 2014). At 1 and 12 months following discharge, autonomic functioning was measured by HRV using time and spectral analysis via 3-lead electrocardiogram at the Study Centre. All-cause hospital readmission was collected from an audit of hospital records by medically trained researcher fellows. Hierarchical linear regression analyses were used to determine the extent to which HRV parameters (Standard Deviation of RR, Median RR (millisecond), Low Frequency Power, Very Low Frequency Power), drive sex-specific readmission outcomes (yes/no) over 2-years. Interaction terms (sex x individual HRV parameter) were used to determine the extent to which HRV was a modifier of the main effects model. Results: Women were more likely to be rehospitalized for all cause morbidity over the ensuing 2-years,
however this was not statistically significant (Coef: 0.09; 95% CIs: -0.03, 0.21). The inclusion of only one of the HRV parameters (Median RR (ms)) substantially ameliorated the chance of women being readmitted (adj. Coef -0.47, 95% CIs: -1.38, 0.43; ns). Conclusion: Women experience significantly poorer autonomic functioning in the year following ACS, but this does not appear to influence sex-specific all-cause readmission over 2 years in a statistically meaningful way.


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P132

Establishing a New Observational Study of Cardiovascular Risk Factors and Chronic Diseases in Puerto Rico: The PROSPECT Study

Josiefer Mattei, Harvard Chan Sch Public Health, Boston, MA; Katherine L Tucker, Univ of Massachusetts, Lowell, MA; Carlos F Rios-Bedoya, FDI Clinical Res, San Juan, PR; Luis M Falcon, Univ of Massachusetts, Lowell, MA; Robert C Kaplan, Albert Einstein Coll of Med, Bronx, NY; Jose F Rodriguez-Orengo, FDI Clinical Res, San Juan, PR

Introduction: Evidence supports a direct link between psychosocial and food-related environmental risk factors, and cardiometabolic conditions. These associations remain markedly understudied at the population level in Puerto Rico (PR), despite the clear and pressing need to alleviate striking disparities in chronic disease in the island. On September 2017, Hurricane Maria devastated PR, imposing urgency for studying trends and associations of risk factors for cardiometabolic conditions under times of distress.
with an underserved and high-risk population, under times of distress.


Funding: No

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P133

Psychological Distress, Diabetes Self-Management, and Cardiovascular Disease Risk Factors Among a Primary Care Sample of Spanish Speaking Hispanic/Latinos With Type 2 Diabetes

Laura M. Pompano, Univ of California, San Diego, San Diego, CA; Linda C. Gallo, San Diego State University, San Diego, CA; Sheila F. Castañeda, San Diego State Univ, San Diego, CA; Melawhy Garcia, California State Univ, Long Beach, California State University, Long Beach, CA; Fatima Muñoz, San Ysidro Health Ctr, Chula Vista, CA; Paulina Mendoza, South Bay Latino Res Ctr, Chula Vista, CA; Gregory A. Talavera, San Diego State Univ, San Diego, CA

Aims: The aim of this study was to examine the relationships between psychological distress (anxiety, depression, and diabetes-distress), diabetes self-management (DSM) behaviors, and cardiovascular disease (CVD) risk factors/diabetes control among adult primary care, non-insulin using Hispanic/Latino patients with type 2 diabetes.

Methods: This abstract presents a cross-sectional analysis of the baseline data from an ongoing clinical trial of 456 Hispanic/Latino participants with type 2 diabetes (mean age 55.2 ± 9.8 years; 63.7% female) at a federally qualified health center in San Diego. General linear models were used to examine associations between anxiety, depression, and diabetes-distress (assessed using the Patient Health Questionnaire-8 [PHQ-8], the Generalized Anxiety Disorder 7-item scale [GAD-7], and the Diabetes Distress scale-2, respectively), DSM behaviors (assessed using the Summary of Diabetes Self-Care Activities Assessment [SDSCA]), and markers of CVD risk (glycated hemoglobin [HbA1c], body mass index, systolic and diastolic blood pressure, and HDL and LDL cholesterol), controlling for the demographics variables of age, sex, and education.

Results: Moderate depression and anxiety symptoms (defined as a PHQ-8 and GAD-7 cutoff of 10) were present in the study sample at rates of 21.5% and 15.4%, respectively. Poorly controlled diabetes (HbA1c > 8.0%) was present in 40.6% of the sample. After controlling for covariates, all three indicators of psychological distress showed significant, negative associations with SDSCA (DSM) scores (p < 0.01). Depression and anxiety symptoms were positively associated with LDL cholesterol (p = 0.020 and p = 0.022, respectively). No other associations among psychological distress and CVD risk factors were significant. DSM behaviors were not associated with any CVD risk factors.

Conclusions: Depression and anxiety affect a large percentage of the Hispanic/Latino population. As greater depression and anxiety symptoms were associated with worsened diabetes self-management behaviors, for example diet and glucose monitoring, there may be implications for DSM and other CVD risk factors. Psychosocial dimensions of health are important to consider when providing care and promoting self-management behaviors in this population, as promoted by frameworks such as the integrative care model.


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Greater Burden of Cardiovascular Disease Among Incarcerated Women of Color Compared to Whites

Monik C Jimenez, Brigham and Women's Hosp, Boston, MA; Lenny Lopez, Univ of California, San Francisco, San Francisco, CA; Kathryn M Rexrode, Brigham and Women’s Hosp, Boston, MA

Background: Although non-institutionalized black American and Latino adults exhibit a disproportionate burden of cardiovascular disease (CVD) compared to US whites, racial/ethnic disparities are not consistently observed among those incarcerated. Importantly, it is uncertain whether the burden of multiple cardiovascular conditions varies by race/ethnicity among incarcerated individuals.

Hypothesis: We assessed the hypothesis that the burden of multiple CVD conditions would be higher among incarcerated non-Hispanic blacks (black) and Latinos compared to non-Hispanic whites (white).

Methods: Data from a sample of 14,499 men and women (weighted N=689,161) from the 2004 Survey of Inmates in State Correctional Facilities, a nationally representative sample of adults incarcerated in state facilities, were analyzed. Computer-assisted personal interviews were utilized to collect information on medical history, demographic and socioeconomic factors, prison activities and various offense related factors. Race/ethnicity was defined as self-reported white, black, Spanish/Latino/Hispanic (Latino), or Other. Prior or current CVD conditions (hypertension, diabetes, BMI≥30 kg/m², heart problems, or stroke) were obtained by self-report. Body mass index (BMI, kg/m²) was based on self-reported height and weight. Three separate outcomes were defined based on the cumulative number of CVD conditions (≥1, ≥2 or ≥3 CVD conditions). Age-adjusted survey weighted multivariable logistic regression was used to estimate racial/ethnic disparities in the burden of CVD conditions separately by sex.

Results: The median age was 34 years (IQR: 26-42) among men and 35 years (IQR: 27-41) among women. A history of ≥1 CVD condition was reported by 41% of men and 51% of women, while 26% of men and 37% of women reported ≥2 CVD conditions and 10% and 15% of men and women, respectively, reported ≥3. In age-adjusted models, among women, significant racial/ethnic disparities were observed among both black and Latina women across all three definitions of CVD burden. The greatest disparities were observed among black women with ≥2 CVD conditions (OR=1.94, 95% CI: 1.62-2.33) followed by Latinas (OR=1.67, 95% CI: 1.32-2.13) compared to whites. Among men in age-adjusted analyses, black men exhibited a similarly greater odds of ≥2 or ≥3 CVD conditions (OR=1.31, 95% CI: 1.18-1.45 and OR=1.36, 95% CI: 1.17-1.57, respectively) compared to white men. Among Latino men compared to whites, modest disparities were only observed for ≥2 CVD conditions (OR=1.17, 95%CI: 1.03-1.33).

Conclusions: Black and Latina women and black men exhibited a significantly greater burden of CVD conditions compared to white women and men, respectively. These data highlight the prominent racial/ethnic disparities among incarcerated populations of color and the need for tailored interventions to reduce cardiovascular risk in these populations.

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Regional Differences in Epidemiology and Outcomes of Heart Failure Admissions Across the United States

Akshay Goel, Hakan Paydak, Jawahar Mehta, UAMS, Little Rock, AR
Introduction: Periodic surveillance of geographical variations in cardiovascular health is important to achieve the goal of reducing regional disparities in healthcare delivery. We aimed to study differences in epidemiology and outcomes of heart failure admissions by geographic regions in the United States.

Hypothesis: We assessed the hypothesis that there exist differences in the outcomes of heart failure admissions based on geographic region.

Methods: The National Inpatient Sample database for the year 2016 was queried. Adult patients admitted with a principal diagnosis of heart failure were identified using validated ICD-10 codes. Comparisons were made between four regions - Northeast, Midwest, South and West. Baseline characteristics of heart failure admissions were identified. The main outcomes of interest were inpatient mortality, length of stay and hospital charges. Statistical analysis was performed using STATA.

Results: A total of 807,764 hospitalizations with a principal diagnosis of heart failure were identified. Of these, 153,233 (18.97%) were in the Northeast; 184,090 (22.79%) in the Midwest; 331,506 (41.04%) in the South; and 138,935 (17.20%) in the West. The baseline characteristics of these admissions and outcomes of interest are depicted in the table. There was a small difference in the mortality rates (highest in West at 3%, and lowest in South at 2.66%, p=0.03) and length of stay (longest in the Northeast, and shortest in the West, p=0.001) between regions. A significant difference was observed in the total hospital charges per hospitalization (nearly $65,000 in the West, and only $37,000 in the Midwest, p<0.001). The differences in all outcomes persisted after adjusting for variables like age, gender, race and co-morbid conditions.

Conclusions: Our study demonstrates the existence of regional differences in the costs and outcomes of healthcare delivery to heart failure patients. Further research is needed to explore the reasons for these differences.

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P136

The Association Between Depressive Symptoms and Cardiovascular Disease Risk Factors Among West African Immigrants in the African Immigrant Health Study

Nwakaego A Nmezi, Univ of Florida, Gainesville, FL; Ruth-Alma Turkson-Ocran, John Hopkins Sch of Nursing, Baltimore, MD, Baltimore, MD; Yvonne Commodore-Mensah, Johns Hopkins Univ Sch of Nursing, Baltimore, MD

Introduction: Cardiovascular disease (CVD) is the leading cause of death globally and in the US. Blacks have a higher burden of CVD compared to other racial/ethnic groups. However, Blacks are not monolithic and include both foreign-born and US-born individuals. West African immigrants (WAIs)—a sub-group of US Blacks—are a growing immigrant population. It is unknown whether depressive symptoms are associated with CVD risk factors among WAIs.

Hypothesis: We hypothesized that depressive symptoms will be associated with having ≥2 CVD risk factors among WAIs.

Methods: We included WAIs born in Ghana, Nigeria, Liberia, Sierra Leone and Cameroon who participated in the African Immigrant Health Study in Baltimore-Washington D.C. The main predictor was depression scores on the Patient Health Questionnaire (PHQ-8). The main outcome variable was CVD risk defined as having ≥2 risk factors, including body mass...
index, self-reported diabetes, hypertension, and hyperlipidemia. Multivariable logistic regression was used to examine the association between depressive symptoms and CVD risk adjusting for age, sex, household income, marital status, and level of education.

**Results:** A total of 326 WAIs were included. The mean age (±SD) was 46 (±10.6) years. Females made up approximately 60% of the sample (n=194). Approximately half of participants reported residing in the US for ≥10 years. Also, 31% were diagnosed with hypertension, 88% were overweight/obese, 20% were diagnosed with high cholesterol and 13% were diagnosed with diabetes. Overall, 41% of participants (n=133) had ≥2 CVD risk factors and 7% (n=22) had moderate/severe depression (PHQ-8 scores ≥10). WAIs who had mild to severe depression were 2.31 (95%CI: 1.2-4.4) times more likely to have ≥2 CVD risk factors compared to those without reported minimal depression levels in the adjusted analyses.

**Conclusion:** We observed a positive association between symptoms of depression and CVD risk factors. WAIs with elevated symptoms of depression had a higher likelihood of having ≥2 CVD risk factors than those reporting minimal depressive symptomology. Targeted behavioral health interventions are needed to help address psychosocial determinants of cardiovascular health among WAIs residing in the US.

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**P137**

**Impaired Microvascular and Endothelial Function Among African-Americans With Coronary Artery Disease**

**An Young,** Samaah Sullivan, Kasra Moazzami, Bruno Lima, Amit Shah, Tene Lewis, Lisa Elon, lian li, Arshed Quyyumi, Viola Vaccarino, Emory Univ, Atlanta, GA

**Background**

African-Americans have disproportionately higher burden of mortality from coronary artery disease (CAD) compared to Caucasians even after adjusting for socioeconomic and cardiovascular risk factors. Racial differences in arterial stiffness have been described, but data on microcirculatory and endothelial vascular function are more limited and it is unknown whether they differ by race in CAD patients.

**Methods**

We studied 313 patients with a recent history of myocardial infarction (MI). Microvascular function was assessed by digital pulse amplitude tonometry (EndoPAT) to determine reactive hyperemia index (RHI), and endothelial function as brachial artery flow mediated dilation (FMD) using ultrasound. Arterial stiffness was assessed using aplanation tonometry (Sphygmocor) to determine pulse-wave velocity (PWV) and central augmentation index (C-AIx). Data on sociodemographics, cardiovascular risk factors, medication use, and CAD severity were collected. Multivariate linear regression models were used to assess the relationship between race and various vascular function measures with adjustment for risk factors. Measures of arterial stiffness were included as control factors in the adjusted model for FMD and RHI.

**Results**

The mean age of this post-MI sample was 51 years (± 6.7 SD); 50% were African-Americans and 49% were female. Compared to Caucasians, African-Americans had worse microvascular function as indicated by lower mean (± SD) RHI (1.7±0.5 vs 2.0±0.6, p<0.0001) and worse endothelial function [FMD mean (3.4±2.4 vs 4.7±3.1, p=0.0002)]. African-Americans also had greater arterial stiffness, including a higher mean C-AIx (26.5±9.0 vs 23.0±9.3, p=0.0019) and PWV (7.7±2.0 vs 7.1±1.8, p<0.0267). After adjustment for cardiovascular risk factors, medications, CAD severity, and arterial stiffness (C-AIx and PWV), black race remained
significantly associated with lower RHI (β=-0.30, p<0.001) and FMD (β=-1.06, p=0.004).

Conclusion
African-Americans with CAD have impaired microvascular and endothelial vasodilatory function compared to Caucasians, independent of CAD risk factors and arterial stiffness. Racial differences in microcirculatory and endothelial function may contribute to worse outcomes among African-Americans with CAD.

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P138

Private School Attendance and Later Life Hypertension

Debbie Barrington, Georgetown Univ, Washington, DC

Introduction: Black Americans have the highest prevalence of hypertension in the United States (US). Higher educational attainment has been found to have an inverse association with hypertension, yet research examining the association between hypertension and components of education not captured by quantity of education, such as type of school attended, private vs. public, has been limited. The positive relationship between private school attendance and academic achievement, with effects particularly robust among Black Americans, suggests a potential role for private school attendance as a protective factor in hypertension.

Hypothesis: Private school attendance compared with public school attendance is hypothesized to be associated with a lower prevalence of hypertension among African American and Afro-Caribbean men and women in the United States.

Methods: Multiple logistic regression models were used to examine type of school attended, private vs. public, and its independent association between hypertension among African American (N = 2693) and Afro-Caribbean (N = 1308) men and women, 18 years and older, in the National Survey of American Life (2001-2003). Odds ratios (OR) of the association between type of school attended and adult hypertension were estimated after adjusting for age, socioeconomic factors, health and lifestyle measures within the models. Adult socioeconomic factors included marital status, education, occupation, home ownership and poverty status. Adult health and lifestyle covariates included obesity, diabetes, smoking, alcohol use and physical activity.

Results: Private school attendance was a risk factor for hypertension among African American men; age-adjusted OR = 2.11; 95%CI: (1.07, 4.15). Conversely, private school attendance was a protective factor for Afro-Caribbean men; age-adjusted OR = 0.34; 95%CI: (0.13, 0.89). After adjusting for adult socioeconomic, health and lifestyle factors, the two-fold higher odds of hypertension compared to those who attended public schools remained among African American men who attended private schools; adjusted OR = 2.11; 95%CI: (0.97, 4.60). After covariate adjustment, private school attendance remained a statistically significant protective factor for Afro-Caribbean men; those who attended private schools had 68% decreased odds of hypertension compared to those men who attended public schools, adjusted OR = 0.32; 95%CI: (0.11, 0.94). No association between hypertension and school-type was found for either African American or Afro-Caribbean women.

Conclusions: These findings suggest that type of school attended is another dimension of education relevant for the cardiovascular health
of African American and Afro-Caribbean men. Additionally, it exerts a differential effect on hypertension by ethnicity.

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P140

Sexual Orientation Disparities in Cardiovascular Risk Factors Differ by Sex and Race/Ethnicity Among High School Aged Youth

Lauren B Beach, Blair C Turner, Ying Han, Dylan Felt, Rachel Marro, Brian A Feinstein, Gregory L Phillips II, Northwestern Univ, Chicago, IL

Compared to their sex-matched heterosexual counterparts, sexual minority high school aged youth have been found to be more likely to be overweight or obese and less likely to meet physical activity guidelines. Racial/ethnic minority (REM) youth have been shown to face similar disparities. These disparities mirror the cardiovascular (CVD) health disparities that have also been detected among sexual minority and REM adults later in life. To date, no national studies have investigated how health disparities associated with poor future CVD outcomes differ at the intersections of sex and race/ethnicity among diverse sexual minority high school aged youth. To compare weight and physical activity outcomes using an intersectional approach, we performed sex-stratified logistic regressions using a pooled national Youth Risk Behavior Surveillance (YRBS) dataset from 2009-2015; White heterosexual students as the dual reference group for all analyses. From these regressions, adjusted Prevalence risk ratios (PRR) were calculated. A total of 409,843 high school aged youth who completed the YRBS surveys across 45 jurisdictions across the United States were included in analyses. Overall, by race/ethnicity, 47.7% of respondents were White, 16.6% were Black, 25.5% were Hispanic/Latino, and 10.2% were “Other” race youth. Among male youth, 92.6% identified as heterosexual, 2.2% as gay, 2.4% as bisexual, and 2.7% as not sure, while among female students, 85.9% identified as heterosexual, 1.86% as lesbian, 8.25% as bisexual, and 4.0% as not sure. With the exception of heterosexual and not sure Other race students, all sexual minority/REM female students had 1.51 to 2.23 times higher risk of being overweight or obese compared to White heterosexual students. All non-White and non-heterosexual male youth were at greater risk of not meeting physical activity guidelines compared to their White heterosexual male student counterparts. Significant interactions between race/ethnicity and sexual identity were detected for both overweight/obesity and physical activity outcomes among female but not male high school aged youth. Future work should continue to characterize CVD risk factors among sexual minority and REM youth and explore how the intersections of these identities may predict risk factors for CVD related outcomes across the life course.

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P141

Association of Type of Antidepressant With Bleeding Risk in Atrial Fibrillation Patients Taking Oral Anticoagulants

Iris Yuefan Shao, J’Neka S Claxton, Emory Univ, Atlanta, GA; Pamela L. Lutsey, Lin Y. Chen, Richard F. MacLehose, Univ of Minnesota, Minneapolis, MN; Alvaro Alonso, Emory Univ, Atlanta, GA
Background:
Inconsistent evidence suggests that concomitant use of certain antidepressants, particularly Selective Serotonin Reuptake Inhibitors (SSRIs), in patients using oral anticoagulants (OAC) might be associated with an elevated risk of bleeding. This study aims to investigate the risk of bleeding associated with initiation of different types of antidepressants among atrial fibrillation (AF) patients on OAC therapy.

Methods:
72334 AF patients that started using antidepressant after initiating OAC therapy were identified from the Truven Health MarketScan Commercial and Medicare Databases for the period 2011-2015. Exposure was defined as prescription filling for SSRI, Serotonin/Norepinephrine Reuptake Inhibitors (SNRI), Serotonin Reuptake Inhibitors (SRI), Tricyclic Antidepressants (TCA) or other antidepressants. The primary outcome was incident hospitalized bleeding, defined by a validated algorithm, after antidepressant initiation. Associations of bleeding by antidepressant types were assessed using adjusted Cox proportional hazards model in pair-wise propensity score (PS) matched cohorts. PS matched cohorts for combinations of antidepressants were generated based on logistic models that included major risk factors for bleeding such as demographic information, comorbid conditions and other medication usage.

Results:
Among eligible patients, 57% initiated SSRI, 14% SNRI, 9% SRI, 9% TCA and 12% others. During a mean follow-up of 21 months, we identified 4035 bleeding episodes. In pair-wise comparisons, SSRI was associated with an increased risk of bleeding when compared to all other antidepressants (Table 1). In contrast, initiating SRIs was associated with small reductions in the risk of bleeding compared to all other types of antidepressants.

Conclusion:
Our results suggest that compared to all other antidepressants, SSRI is associated with an increased risk of bleeding. This information may be valuable to inform antidepressant choice in anticoagulated patients with AF.

Table 1. Risk of Bleeding Associated with Type of Antidepressant in Atrial Fibrillation Patients Taking Oral Anticoagulants

<table>
<thead>
<tr>
<th>Treatment Group versus Control Group</th>
<th>Hazard Ratio (95% Confidence Interval)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSRI vs SNRI</td>
<td>1.95 (1.93, 1.97)</td>
</tr>
<tr>
<td>SSRI vs SNR</td>
<td>1.16 (1.09, 1.23)</td>
</tr>
<tr>
<td>SSRI vs Tricyclic</td>
<td>1.02 (0.88, 1.18)</td>
</tr>
<tr>
<td>SSRI vs Other</td>
<td>1.11 (0.99, 1.27)</td>
</tr>
<tr>
<td>SRI vs SSRI</td>
<td>0.98 (0.87, 1.11)</td>
</tr>
<tr>
<td>SRI vs Tricyclic</td>
<td>0.99 (0.78, 1.25)</td>
</tr>
<tr>
<td>SRI vs Other</td>
<td>0.93 (0.85, 1.01)</td>
</tr>
<tr>
<td>Tricyclic vs SSRI</td>
<td>1.00 (0.86, 1.18)</td>
</tr>
<tr>
<td>Tricyclic vs Other</td>
<td>0.96 (0.82, 1.11)</td>
</tr>
<tr>
<td>Others vs SSRI</td>
<td>0.99 (0.79, 1.20)</td>
</tr>
</tbody>
</table>

*These results correspond to PS-matched populations. All models were adjusted for age, sex, Hispanic status, race, smoking status, comorbid conditions (heart failure, hypertension, diabetes, myocardial infarction, peripheral artery disease, kidney failure, stroke, bleeding, anemia, congestive heart failure, mood disorder, cognitive impairment, chronic obstructive pulmonary disease, liver disease and other medications) angiotensin, thiazide diuretics, angiotensin receptor blockers, beta blockers, calcium channel blockers, and lipid lowering medications.


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P142

Heart Healthy Behaviors in Young Women: What Prevents Teens From Going Red?

Courtney A Brown, Div of Adolescent/Young Adult Med, Boston Children’s Hosp, Boston, MA; Anna C Revette, Survey and Data Management Core, Div of Population Sciences, Dana-Farber Cancer Inst, Boston, MA; Sarah D de Ferranti, Dept of Cardiology, Boston Children’s Hosp; Dept of Pediatrics, Harvard Medical Sch, Boston, MA; Jingyi Liu, Dept of Pediatrics, Harvard Medical Sch, Boston, MA; Catherine Stamoulis, Holly C Gooding, Div of Adolescent/Young Adult Med, Boston Children’s Hosp; Dept of Pediatrics, Harvard Medical Sch, Boston, MA

Introduction: Ideal cardiovascular health behaviors are the foundation of primordial prevention as health behaviors initiated in adolescence track into adulthood. Adolescent and young adult (AYA) women may experience unique barriers to and facilitators of heart health behaviors.
healthy behaviors. Using an explanatory sequential mixed methods design, we examined how AYA women perceive cardiovascular health.

**Methods:** We surveyed a random convenience sample of 331 AYA women ages 15-24 years presenting for care at an urban academic medical center and a community health center using the AHA National Women’s Health Study survey. Survey data guided development of the qualitative guide used during eight online, semi-structured focus groups with 32 young women. We report descriptive statistics performed using Matlab (Mathworks, Inc.) and thematic analyses conducted to synthesize data from the online focus groups using NVivo 11.

**Results:** A total of 280 young women (84.6%) performed at least one preventive behavior in the past year. Actions taken included visiting a doctor [261 (78.9%)], exercising [247 (74.6%)], and reducing stress [174 (52.6%)]. AYA’s most commonly reported barriers to heart healthy actions were a failure to perceive oneself at risk for heart disease [130 (39.3%)] and stress [108 (32.6%)]. Focus group participants discussed several barriers including time constraints (“we just don’t have time to worry about our hearts”), lack of access to affordable gyms and healthy food (“improving health would be easier if healthy food weren’t expensive”), and mental health (“working on depression or anxiety so one doesn’t stop exercising or stop eating healthy because of life stresses”). Most [237 (71.6%)] participants identified a desire to improve their health as a reason for performing preventive behaviors, with 62.5% [n=207] wanting to live longer and 61.9% [n=205] wanting to feel better. Many AYA women surveyed were encouraged to take action by a family member [151 (45.6%)], a health care professional [113 (34.1%)], or a friend [106 (32.0%)]. Most participants [241 (72.8%)] felt that increased access to healthy food would help facilitate a heart healthy lifestyle. Focus group participants reported interpersonal connections (“having a strong support system to encourage you”), personal motivation (“I finally get fed up with myself and force myself to go back to the gym”), celebrities (“contact the Kardashians and tell them to promote”), and music as facilitators of preventive behaviors.

**Conclusions:** Our results emphasize the competing concerns AYA women face - including time constraints, access to resources, and mental health issues - and how these factors impact their ability to perform preventive behaviors. Future campaigns should address stressors experienced by young women and capitalize on personal support systems, celebrities and music to encourage heart healthy behaviors.

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**P143**

**Late Success in Weight Loss Trials: Do Participants Start Losing Weight After 6 Months?**

Gerald J Jerome, Towson Univ, Towson, MD; Arlene T Dalcin, Johns Hopkins Univ Sch of Med, Baltimore, MD; Deborah R Young, Kaiser Permanente Southern California, Pasadena, CA; Janelle W Coughlin, Kimberly A Gudzune, Nola Durkin, Nae-Yuh Wang, Hsin C Yeh, Gail L Daumit, Lawrence J Appel, Johns Hopkins Univ Sch of Med, Baltimore, MD

**BACKGROUND:** Weight loss programs often start with an initial phase of intensive lifestyle coaching to facilitate early weight loss, with a typical weight loss goal of ≥ 5%. While early weight loss is associated with long-term weight loss success, less is known about those who do not lose weight in the initial phase. This study examines those without initial weight loss success, but lose weight later. **METHODS:** Analyses included 346 obese adults from the
POWER Hopkins weight loss trial and 673 overweight to obese adults from the PREMIER hypertension control trial. Mutually exclusive categories are based on weight loss success (≥ 5% reduction from baseline) at 6m and 12m: continued success (success 6m and 12m); regainer (success 6m then regained 12m); no success (no success 6m or 12m); and late success (12m success only). RESULTS: No success (NS) was the most common category among control and intervention participants in both studies (see table). There were low rates of late success (LS) in POWER (intervention 5%, control 7%, p=.25) and PREMIER (intervention 5%, control 8%, p=.75). Within the POWER intervention, LS and NS were similar in age, sex, race, and baseline weight. Coaching contact rates were similar at 1-6m (LS 64%, NS 57%, p=.49) and 7-12m (LS 45%, NS 46%, p=.89). Within the PREMIER intervention LS had a lower baseline weight than NS (89 vs 99 kg, p=.01), but were similar in age, sex, and race. Coaching contact rates are similar at 1-6m (LS 77%, NS 72%, p=.23) and 7-12m (LS 66%, NS 62%, p=.58). CONCLUSION: Given the small fraction of intervention participants with late success (only 5%), alternative strategies are needed to address the large fraction of persons without initial weight loss success.

Disclosures:

G.J. Jerome: G. Consultant/Advisory Board; Modest; Sharecare, Inc has commercialized the Innergy weight-loss program. Johns Hopkins receives fees for related consultation and faculty members who participate in the consulting may receive a portion. A.T. Dalcin: G. Consultant/Advisory Board; Modest; Sharecare, Inc has commercialized the Innergy weight-loss program. Johns Hopkins receives fees for related consultation and faculty members who participate in the consulting may receive a portion. K.A. Gudzune: G. Consultant/Advisory Board; Modest; Sharecare, Inc has commercialized the Innergy weight-loss program. Johns Hopkins receives fees for related consultation and faculty members who participate in the consulting may receive a portion. N. Durkin: G. Consultant/Advisory Board; Modest; Sharecare, Inc has commercialized the Innergy weight-loss program. Johns Hopkins receives fees for related consultation and faculty members who participate in the consulting may receive a portion. N. Wang: None. H.C. Yeh: None. G.L. Daumit: None. L.J. Appel: G. Consultant/Advisory Board; Modest; Sharecare, Inc has commercialized the Innergy weight-loss program. Johns Hopkins receives fees for related consultation and faculty members who participate in the consulting may receive a portion.

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P144

The Effect of a Community-Based Healthy Lifestyle Behavior Change Program on Simple 7 Score Among Rural Women

Rebecca Seguin, Cornell Univ, Ithaca, NY; Sara Folta, Tufts Univ, Boston, MA; Grace Marshall, Meredith Graham, Cornell Univ, Ithaca, NY; David S Strogatz, Bassett Res Inst, Cooperstown, NY

Objective: The objective of this study was to evaluate the effects of a multilevel healthy lifestyle behavior change program for women living in rural areas where higher rates of
cardiovascular disease are influenced by poverty, reduced access to health care and unique social and built environment challenges. **Methods**: In eleven medically underserved rural towns in New York, 182 overweight and obese sedentary women 40 years and older enrolled in a community-randomized trial. Communities randomized to Group 1 (intervention) participated in six months of hour-long, twice weekly experiential learning classes that included progressive strength training, aerobic exercise and skill-based nutrition education (individual level), and a civic engagement curriculum focused on healthy food and physical activity environments (social, community and policy levels); classes were facilitated by local health educators trained by the research team. Communities randomized to Group 2 (delayed intervention control) received the intervention immediately following the completion of intervention activities for Group 1. All components of the Simple 7 score were recorded at baseline (prior to randomization) and at six months (post-intervention for Group 1, pre-intervention for Group 2). Weight, height, blood pressure, blood cholesterol and blood glucose were measured directly and smoking status, diet and physical activity were self-reported. Multivariate regression analyses were used to examine change in Simple 7 score from baseline to outcome. Initial models controlled for study site, baseline Simple 7 score, education and age, and were based on the 107 participants with complete data. **Results**: Simple 7 scores were similar for both groups prior to randomization (7.91 for Group 1, 7.83 for Group 2). At the end of the six month intervention period for Group 1, the Simple 7 score for Group 2 was unchanged (7.85) but increased to 8.98 for Group 1 participants (p=0.02 for the difference between groups in Simple 7 change). The percentage of Group 1 participants in the optimal range of scores (10-14) rose from 14.8% to 37.0%. The Simple 7 components showing the greatest improvement were BMI, physical activity and healthy diet score. Additional analyses will assess potential bias associated with incomplete data and will examine evidence for the validity of self-reports on physical activity and diet. **Conclusion**: The multilevel healthy lifestyle program is feasible for implementation in rural settings with limited resources and showed promise for reducing cardiovascular disease risk in midlife and older rural overweight and obese women.

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P145

**Outcomes of an EMR-Enabled Acute Ischemic Stroke Care Path in a Primary Stroke Center**

Aaron Dunn, Selena Pasadyn, Francis May, Cleveland Clinic Lerner Coll of Med, Cleveland, OH; Dolora Wisco, Cleveland Clinic Fndn, Cleveland, OH

**Background**: One major challenge in health care is to improve value, which is best measured at the disease or treatment level. Evidence-based, standardized care has been proposed and studied as one potential method to drive this process. We hypothesize that enablement of the Acute Ischemic Stroke (AIS) Care Path within the electronic medical record (EMR) improves clinical outcomes of patients with acute ischemic stroke. **Methods**: We compared the length of stay (LOS), in-patient mortality, rate of hospital readmission within 30 days, NIH Stroke Scale (NIHSS) at admission in patients, and post-discharge modified Rankin Scale (mRS) with ischemic stroke in the periods before (January to December 2015) and after (January to December 2016) EMR-enablement of the AIS Care Path. **Results**: A total of 1,858 patients were diagnosed with acute ischemic stroke during the entire study period. Patients presented with more severe stroke symptoms, as evidenced by a higher NIHSS at admission in
the post-intervention period (11.4 ± 0.7 vs 10.5 ± 0.7, p=0.05). There was no difference in LOS (5.2 ± 0.3 days vs 5.3 ± 0.2 days, p=0.41), and there was a significant reduction in rate of hospital readmission within 30 days of discharge (8.9 ± 2.0 vs 10.7 ± 2.0, p=0.05). There were trends toward decreased in-patient mortality (2.6 ± 0.7% vs 3.3 ± 1.5%, p=0.22) and improved functional outcomes (2.3 ± 0.3 vs 2.6 ± 0.4, p=0.20) after EMR-enablement of the AIS Care Path. **Conclusion:** EMR-enablement of the AIS Care Path, a means of further standardizing stroke care, was associated with lower readmission and trends toward lower mortality and improved functional outcomes.

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P146

**Trends in Recurrent Coronary Heart Disease Following Myocardial Infarction Among US Men and Women Between 2008 and 2016**

Sanne A Peters, The George Inst for Global Health, Oxford, United Kingdom; **Lisandro D Colantonio,** Hong Zhao, Vera Bittner, Univ of Alabama at Birmingham, Birmingham, AL; Michael Farkouh, Peter Munk Cardiac Ctr and Heart and Stroke Richard Lewar Ctr, Univ of Toronto, Toronto, ON, Canada; Paul Dluzniewski, Amgen, Thousand Oaks, CA; Bharat Poudel, Paul Muntes, Univ of Alabama at Birmingham, Birmingham, AL; Mark Woodward, The George Inst for Global Health, Univ of New South Wales, Sydney, Australia

Background: In the US, morbidity and mortality from coronary heart disease (CHD) has declined considerably from the 1970’s through the 2000’s. We examined whether rates of recurrent MI, recurrent CHD, heart failure hospitalization, and all-cause mortality among US men and women with a MI hospitalization have continued to decline between 2008 and 2016, and whether this differs between the sexes.

Methods: Data were used from 1,369,617 (53% women) US adults <65 years of age with commercial health insurance in the MarketScan database and US adults ≥66 years of age with government health insurance through Medicare who had a MI hospitalization between January 1, 2008 and September 30, 2016. For each year, sex-specific rates of recurrent MI, recurrent CHD, heart failure hospitalization, and all-cause mortality (Medicare only) per 1,000 person-years were calculated at 30 days from the MI discharge date.

Results: Between 2008 and 2016, rates of recurrent MI declined by 15%, from 190 to 162/1000 person-years, in men and by 27%, from 220 to 160/1000 person-years, in women. CHD recurrence rates decreased by 22%, from 311 to 244/1000 person-years, in men and by 32%, from 318 to 216/1000 person-years, in women (Figure). Heart failure hospitalization decreased by 4%, from 367 to 352/1000 person-years, in men and by 18%, from 517 to 425/1000 person-years, in women. Rates of 30-day mortality reduced by 5%, from 1,208 to 1,142/1000 person-years, in men and by 4%, from 1,416 to 1,358/1000 person-years, in women.

Conclusion: Rates of recurrent MI, recurrent CHD, heart failure hospitalization, and all-cause mortality within 30 days after hospitalization for MI continue to decline in US adults, with greater reductions in the recurrence of CHD among women than men. Factors underpinning these trends warrant further investigation.
Background: Chronic Disease Management (CDM) plans are usually administered by general practitioners (GPs) to assist those with a chronic medical condition, such as stroke, and provide better management of risk factors. Despite the prevalent use of CDM plans, its comprehensiveness and the fact that there is a government commitment to fund it, there is limited evidence of its effectiveness in Australian survivors of stroke. We aimed to assess the effectiveness of CDM plans on preventing the recurrence of CVD-related serious adverse events.

Methods: Patients comprised survivors of stroke/TIA who participated in the Shared Team Approach between Nurses and Doctors For Improved Risk factor Management (STAND FIRM) trial (n = 563). We used standardised anthropometric, biochemical and blood pressure data, collected at baseline, to evaluate risk factors for stroke/TIA. Poisson regression models were used to determine the incidence rate ratio (IRRs) of increasing exposure to being on a CDM plan over 3 years, while adjusting for confounding factors. We used the total count of CVD-related events and deaths within 3 years after stroke/TIA, based on either hospital discharge codes or adjudication by two independent stroke specialists.

Results: Five hundred and sixty-three patients were included (median age 70; 36% female). There were 305 CVD-related events over the three years (mean 0.54), in which a third (104)
were adjudicated and two-thirds (201) were derived from hospital discharge codes alone. Nearly a quarter (27%) did not take up a CDM plan over the three years, a third (33%) were on plans for less than 1.5 years and 40% were on plans from 1.5 years to 3 years. The factors most strongly associated with decreased incidence of CVD-related events were duration on a CDM plan (Adjusted IRR (aIRR) 0.85, 95% confidence interval (95%CI) 0.77-0.93; p<0.001), higher level of education (aIRR 0.55, 95%CI 0.42-0.71; p<0.001), more physically active occupation (aIRR 0.54, 95%CI 0.41-0.70; p<0.001) and greater Assessment of Quality of Life (AQoL) score (aIRR 0.24, 95%CI 0.15-0.41; p<0.001).

**Conclusion:** Being on a CDM plan for a longer duration appeared to reduce the occurrence of CVD-related events within 3 years after stroke, potentially via more closely controlled risk factors. Patients should be encouraged to return for regular reviews of their CDM plans to enhance secondary prevention strategies, and maintain a better quality of life.


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**P148**

**Early Follow-Up Appointments for Congestive Heart Failure Admissions**

**Emily Schultz**, Peter Sayegh, Akshai Bhandary, Lenox Hill, NY, NY

**Introduction:** Congestive heart failure (CHF) admissions place a financial burden on patients and the healthcare system. The national direct medical costs of CHF have reached $20.9 billion and a CHF related hospitalization costs $14,631 per patient. Studies have demonstrated an association between early post-discharge follow up within 7 days and a reduction in readmission rates. Our study attempts to characterize the rates of follow up appointments in patients discharged from the medicine service in an urban academic hospital.

**Hypothesis:** We hypothesized the rate of early follow-up appointments provided to patients with a diagnosis of an acute CHF exacerbation will be low.

**Methods:** We performed a chart review of patients admitted to our institution from January 2016- February 2017 to the medicine service, including regular medicine floor and telemetry units, with a primary or secondary discharge diagnosis of acute systolic or diastolic heart failure. Discharge paperwork was reviewed for presence of an appointment with a primary care physician (PCP) or cardiologist scheduled within 7 days of discharge, including date and time of appointment. Patients discharged from the cardiology or other services and patients with dispositions of hospice or death were excluded.

**Results:** Over a 13 month period, 63 patients were discharged from the medicine service with a primary or secondary diagnosis of CHF, twelve patients were excluded due to disposition. Among 51 patients, 15.7% (CI 95%, 0.07-0.286) were scheduled for follow-up appointment within 7 days of discharge with a PCP or cardiologist and 2 patients had appointments documented after 7 days. Therefore, 80.4% of patients (CI 95%, 0.695-0.913) did not have any scheduled follow up on their discharge summaries.

**Conclusion:** In conclusion, the majority of CHF patients admitted to the medicine service of our institution are not provided appointments within 7 days of discharge. Data has shown that early follow up appointments are associated with reduced readmission rates. Lowering CHF readmissions are important for reducing medical complications and financial burden on patients and the healthcare system. Our future interventions will focus on increasing the number of patients with appropriate 7 day
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Ideal Cardiovascular Health is Associated With the Characteristics of and Better Access to Primary Care in a Publicly Funded Healthcare System

Sarah S Singh, Stephanie J Frisbee, Univ of Western Ontario, London, ON, Canada

Background: Cardiovascular health (CVH) and CVD prevention remains a top public health priority across North America. The health of Canadians is largely accredited to the publicly funded healthcare system, which affords “free” healthcare to all its citizens. However, there is little evidence demonstrating whether the characteristics of and access to primary care by Canadians directly impacts their likelihood of ideal CVH. Objective: To examine the association between ideal CVH and the characteristics of and access to primary care in Canadians. Data and Methods: This study is a cross-sectional design using adult data from the Canadian Community Health Survey (CCHS) 2015-2016 database. The CCHS is a nationwide, nationally representative survey that collects information on the health status, health care access and utilization, and health determinants of the Canadian population. CVH, defined using the AHA CVH Index (CVHI), was determined using self-reported responses in CCHS. Weighted logistic regression was performed to examine the association between ideal CVH and the characteristics of and access to primary care, including having regular care, receiving coordinated care, ER use and access to routine care. Models were also adjusted for individual characteristics known to affect CVH. Results: The majority of the population were females (51%), aged 40-60 (37%), with tertiary education (64%) and of the White race (79%). Overall, 19% of the population had ideal CVH (ideal status in 6-7 CVHI factors), representing approximately 6 million individuals nationwide. Individuals reported having a regular primary healthcare provider (82%), insurance for prescription medication (76%), high coordination in their healthcare between health professionals (10%), difficulties in accessing routine care in the past 12 months (3%). The likelihood of ideal CVH were highest in those who reported having: a regular provider (OR 1.11, 95% CI 1.05-1.17), higher coordination of care (OR 1.10, 95% CI 1.01-1.20) and using the ER less frequently (OR 0.90, 95% CI 0.80-0.95). After controlling for age, sex and race, only having a regular provider (OR 1.11, 95% CI 1.02-1.20) and not reporting difficulties in accessing routine care in the past 12 months (OR 1.02, 95% CI 1.01-1.04) were significantly associated with ideal CVH. Conclusion: Findings from this study suggest that individuals experiencing better primary healthcare, including having a regular primary care physician or having less difficulty accessing care, are more likely to have ideal CVH than those experiencing poor primary healthcare. Further studies should investigate policies that promote better primary healthcare as interventions for preventing CVD and improving CVH.

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P150

Age, Gender and Race Variations in QRS Duration in Patients With Atrial Fibrillation

Hassan Tahir, Landai Nguyen, Sarina Sachdev, Bassam Omar, G. Mustafa Awan, Christopher
Malozzi, Farnoosh Rahimi, UNIVERSITY SOUTH ALABAMA, MOBILE, AL

**Background:** Atrial fibrillation (AF) is associated with increased incidence of congestive heart failure (CHF). While patients with intraventricular conduction delay were shown to have increased risk of atrial fibrillation, recent analysis of a study revealed increased mortality among patients with QRS 90-119 ms and AF. The demographics of QRS duration (QRSD) in AF remain under-studied. **Methods:** A University-based EKG database was randomly searched for 150 total EKGs: 75 EKGs were with AF; another 75 were with sinus rhythm, as a control group. Demographics, heart rate and QRSD were documented. QRSDs were retrieved from the baseline electrocardiograms of patients included in both groups, and were compared using student’s T test. Further subgroup analyses based on age, gender and race were also performed. **Results:** The mean QRSD in AF group was 102 ± 22 ms compared to 92 ± 19 ms in SR group (P < 0.05). In patient’s < 65 years of age, QRSD in AF group was 96 ± 12 ms compared to 92 ± 19 ms in SR group (P = NS); however, in patient’s ≥ 65 years of age, QRSD in AF group was 107 ± 26 ms compared to 91 ± 18 ms in SR group (P < 0.05). In males, QRSD in AF group was 102 ± 22 ms compared to 89 ± 16 ms in SR group (P < 0.05); however, in females, QRSD in AF group was 94 ± 21 ms compared to 93 ± 20 ms in SR group (P = NS). In white patients, QRSD in AF group was 102 ± 20 ms compared to 90 ± 14 ms in SR group (P < 0.05); however, in black patients, QRSD in AF group was 104 ± 27 ms compared to 94 ± 23 ms in SR group (P = NS). **Conclusion:** The incidence of AF, approaching 6 million in the US, continues to rise in epidemic proportions, and is expected to double over the next few decades as the population ages. The poor rate control in AF, in addition to the loss of the atrial contraction, are two main factors thought to be responsible for symptoms and development of CHF. In our cohort, we demonstrated a significant association between AF and widened QRSD, previously shown to correlate with poor outcome in AF patients. In age analysis, the development of intraventricular conduction delay (IVCD) was significant only in the elderly with AF, who are known to be at higher risk of CHF. IVCD was also more common in white patients compared to black patients; of interest, white patients have been previously shown to develop CHF at an older age compared to black patients, suggesting that IVCD may play a role in the CHF mechanism in this subgroup with AF. In our cohort, males, but not females, had a significantly wider QRSD in AF compared to control. Our findings shed some light on a potentially new mechanism of added morbidity and mortality in AF patients, with higher prevalence in elderly white males, a subgroup which may benefit from early detection and treatment of AF and CHF. Further studies will help validate our findings in a larger cohort and in patients with CHF diagnosis.


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**P151**

**Plasma Cyclic Guanosine Monophosphate (cGMP) and Heart Failure With Preserved Ejection Fraction: The Atherosclerosis Risk in Communities (ARIC) Study**

Di Zhao, Eliseo Guallar, Chiadi E Ndumele, Dhanajay Vaidya, Pamela Ouyang, Wendy S Post, Joao A Lima, Wendy Ying, Johns Hopkins Univ, Baltimore, MD; Vinita Subramanya, Emory Univ, Atlanta, GA; David A Kass, Johns Hopkins Univ, Baltimore, MD; Ron C Hoogeveen, Baylor Coll of Med, Houston, TX; Sanjiv J Shah, Erin D Michos, Johns Hopkins Univ, Baltimore, MD

**Introduction**

Cyclic guanosine monophosphate (cGMP) is an
intracellular second messenger, synthesized through nitric oxide (NO) and natriuretic peptide (NP) pathways, with two different downstream effects on the cardiovascular system. Stimulators of cGMP are potential candidates in treating heart failure with preserved ejection fraction (HFP EF). However, the associations between plasma cGMP, HFP EF, and atherosclerotic cardiovascular disease (ASCVD) in the general population are unknown. We hypothesized that cGMP mediates HFP EF and ASCVD events, and that associations differ by sex.

**Methods**

We included 1,034 ARIC participants selected by case-cohort design with over-sampling of participants with incident HFP EF. cGMP was measured using visit 4 plasma samples. Cox proportional hazard regression models were used to assess the relationship of cGMP with incident HFP EF, coronary heart disease (CHD), and ASCVD (CHD + stroke). Models were adjusted for sampling weights to provide estimates applicable to the overall ARIC population. Covariates included demographics and CVD risk factors. Models also adjusted for NT-proBNP, which is upstream of cGMP production in the NP regulated pathway.

**Results**

Mean (SD) age was 63.2 (5.6) years and median (IQR) cGMP was 3.4 pmol/mL (2.4, 4.6). During 16.7 years of follow-up, there were 272 HFP EF, 179 ASCVD, and 129 CHD incident events. In models adjusted for CVD risk factors, the HRs (95% CI) comparing 3rd tertile with 1st tertile of cGMP for ASCVD, CHD and HF were 1.8 (1.1, 2.9), 1.9 (1.2, 3.0) and 2.0 (1.2, 3.3), respectively. In models further adjusted for NT-proBNP, associations were attenuated and not significant [HRs 1.2 (0.7, 2.0), 1.5 (0.96, 2.5) and 1.7 (0.98, 2.9), respectively]. There were no significant interactions by sex.

**Conclusions**

cGMP levels are associated incident HFP EF, ASCVD, and CHD; however, after NT-proBNP adjustment, associations were attenuated, suggesting that plasma cGMP levels reflect a greater effect as a downstream messenger in NP than NO signaling pathways.
reduced ejection fraction underwent a 12-week personalised home-based physical activity programme. This involved increasing daily pedometer step count by 2000 steps from baseline. Patients completed exercise, cardiac function and quality of life tests pre-post intervention. Sixteen of the 20 patients attended one of three focus group discussions to provide their views around the decision to participate in the programme and their experience of the programme when enrolled.

Results: Seventeen patients (85%) completed the intervention, and 15 patients achieved the daily target step count which increased from baseline to 3 weeks by 2546 (5108±3064 to 7654±3849, p=0.03), and maintained until week 12 (9022±3942). On completion of the intervention, quality of life improved by 15% (26±18 vs. 22±19), cardiac index and stroke volume increased by 11% and 19% respectively (6.8±1.5 vs. 7.6±2.0 L/min/m2; and 127 ± 34 vs 151 ± 34, P=0.05). Workload and O2 consumption at anaerobic threshold increased by 16% (49±16 vs. 59±14 watts, p=0.01) and 10% (11.5±2.9 vs 12.8±2.2 ml/kg/min).

Thematic analyses identified 10 themes influencing participation and maintenance. These included patient’s fear of engaging in physical activity, family influences on engagement with physical activity, support from clinicians and research staff, and increased confidence as a result of participating in a personalised programme.

Conclusion: A personalised home-based physical activity intervention programme is feasible and for patients with stable chronic heart failure and led to improved quality of life and submaximal exercise capacity. However, qualitative findings suggest that outcomes are likely to be contingent on personalised feedback and support from suitably trained team members to increase confidence and self-efficacy, family support, and endorsement of the programme from a clinician.

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P153

Depressive Symptoms and First Hospitalization for Heart Failure: Findings From the Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study

Yulia Khodneva, Univ of Alabama, Birmingham, AL; Parag Goyal, Weill Cornell Univ, New York, NY; Emily Levitan, Elizabeth Jackson, Univ of Alabama, Birmingham, AL; Madeline Sterling, Weill Cornell, New York, NY; Andrea Cherrington, Raegan Durant, Univ of Alabama, Birmingham, AL; Monika Safford, Weill Cornell, New York, NY

Introduction: Depressive symptoms are independently associated with cardiovascular disease (CVD), including coronary heart disease (CHD) and stroke. It is unclear whether depressive symptoms are associated with first heart failure (HF) hospitalization and whether this relationship differs by ejection fraction (EF). We hypothesized that depressive symptoms are associated with increased risk of first HF hospitalization among community dwelling adults free of HF or coronary heart disease at baseline, and that this relationship would be similar by EF.

Methods: We examined this relationship in the REGARDS study, a prospective longitudinal cohort of community dwelling adults aged ≥45 years (55% women, 41% black) from across the continental US, with oversampling of blacks and residents of the Southeast. Participants completed a baseline survey on medical history and health behaviors, and an in-home visit which collected physiologic parameters, blood and urine samples, ECG, and medication inventory. Participants are followed prospectively and hospital records are collected for CVD-related hospitalizations. Depressive symptoms were defined as score ≥4 on the 4-item Center for Epidemiologic Studies Depression scale (CES-D-4). HF hospitalizations were expert adjudicated and specified according to EF as preserved EF (EF >40%)
Results: Over a median [IQR] of 9.3 [6.4-11] years of follow-up, there were 614 first HF hospitalizations among 22,465 individuals (384 HFrEF, 230 HFrEF). Participants with depressive symptoms had less education and lower annual income. The age-adjusted first HF hospitalization incidence rates per 1000 person-years were 4.6 (95% CI, 3.2-4.0) for participants with depressive symptoms versus 2.6 (95% CI, 2.3-2.8) for non-depressed, p 0.0002. This elevated risk remained significant after controlling for a host of CVD risk factors. When HFrEF was assessed separately, depressive symptoms were associated with increased risk of hospitalization after controlling for all covariates (hazard ratio [HR] 1.54, 95% CI 1.06-2.22). In contrast, depressive symptoms were not associated with first HFrEF hospitalization in both unadjusted and adjusted analyses.

Conclusions: Depressive symptoms at baseline were independently associated with future risk of first hospitalization for HFrEF but not for HFrEF.


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P154

Healthy Lifestyle and Risk of Incident Heart Failure With Preserved and Reduced Ejection Fraction in Postmenopausal Women: The Women's Health Initiative Study

Corinna A Noel, Brown Univ, Providence, RI; Michael J LaMonte, Univ at Buffalo, Buffalo, NY; Deborah Pearlman, Brown Univ, Providence, RI; Matthew Allison, Aladdin H Shadyab, Univ of California San Diego, La Jolla, CA; Bernhard Haring, Univ of Wuerzburg, Wuerzburg, Germany; Lisa Warsinger Martin, George Washington Univ, Washington DC, DC; Hailey Banack, Univ at Buffalo, Buffalo, NY; Deepika Laddu, The Univ of Illinois at Chicago, Chicago, IL; Patricia K Nguyen, Stanford Univ, Palo Alto, CA; JoAnn E Manson, Harvard Univ, Boston, MA; Charles B Eaton, Brown Univ, Providence, RI

Background: Heart failure (HF) is a growing health concern in the United States. Lifestyle risk factors including diet, physical activity, cigarette smoking, and body mass index (BMI), have been shown to be independently and jointly associated with incident heart failure. However, these associations have not been evaluated for HF subtypes, HF with reduced ejection fraction (HFrEF) or HF with preserved ejection fraction (HFrEF).

Objective: To assess the combined associations of diet, physical activity, cigarette smoking, and BMI with risk of HFrEF and HFrEF subtypes.

Methods: 39,893 postmenopausal women aged 50-79, without self-reported HF at baseline, were included in this analysis. A lifestyle score was created following a similar method previously used in WHI, defining the following healthy criteria: high diet quality (Alternate Healthy Eating Index quintile 4 or 5), being physically active (more than 150 minutes per week of moderate exercise or 75 minutes per week of vigorous exercise or equivalent combination), not a current cigarette smoker, and BMI between 18.5 and 25 kg/m². Women received 1 point for each healthy criterion that was met, and points were summed to obtain the healthy lifestyle score, ranging in value from 0 (least healthy) to 4 (most healthy). Trained adjudicators determined cases of incident heart failure through 2018, defining the following healthy criteria: high diet quality (Alternate Healthy Eating Index quintile 4 or 5), being physically active (more than 150 minutes per week of moderate exercise or 75 minutes per week of vigorous exercise or equivalent combination), not a current cigarette smoker, and BMI between 18.5 and 25 kg/m². Women received 1 point for each healthy criterion that was met, and points were summed to obtain the healthy lifestyle score, ranging in value from 0 (least healthy) to 4 (most healthy). Trained adjudicators determined cases of incident heart failure through 2018, defining HFpEF as EF≥45% and HFrEF as EF<45%.

Results: Over a mean follow-up of 14.5 years, 2426 HF incident hospitalized cases were documented and confirmed, classifying 1345 cases as HFrEF and 685 cases as HFrEF. Healthy lifestyle was strongly associated with a decreased risk of both HFpEF and HFrEF (Table).
Conclusion: Findings suggest that a healthy lifestyle may be associated with decreased risk of HF subtypes among postmenopausal women. Results from this research provide a better understanding of the role of modifiable lifestyle factors in each of the HF subtypes, allowing for the development of more targeted primary and secondary prevention strategies specific to HFpEF and HFrEF.


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P155

Smoking, Its Cessation, and Future Risk of Heart Failure: the Atherosclerosis Risk in Communities (ARIC) Study

Ning Ding, Johns Hopkins Univ, Baltimore, MD; Amil M Shah, Harvard Medical Sch, Boston, MA; Michael J Blaha, Johns Hopkins Univ, Baltimore, MD; Patricia P Chang, Univ of North Carolina (UNC) at Chapel Hill, Chapel Hill, NC; Wayne D Rosamond, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Kunihiro Matsushita, Johns Hopkins Univ, Baltimore, MD

Introduction: Smoking is considered as a major risk factor for cardiovascular disease, including heart failure (HF). Few studies have evaluated the prospective association of detailed smoking parameters (including duration, intensity, and cessation) with incident HF. Hypotheses: These smoking parameters will be associated with incident HF. Methods: In 14,010 ARIC participants free of a history of HF at baseline (1987-89), we quantified the associations of smoking parameters (pack-years, duration, and intensity [pack/day]) with incident HF (hospitalizations with HF diagnosis [ICD-9: 428.0-428.9] or a death certificate ICD-9 code 428.0-428.9 or ICD-10 code I50.0-I50.9) using Cox models. Years since quitting in former smokers (<5, 5-9, 10-19, 20-29, and ≥30 years) were explored as time-varying variables, with time-varying covariates whenever possible.

Results: Over a median follow-up of 26 years, there were 3,047 cases of HF. Pack-years was significantly associated with incident HF (HR 1.31 [95% CI 1.28-1.35] per 20 pack-years). Both smoking duration and intensity showed significant associations with HF (HR 1.62 [1.55-1.70] per 20 years of smoking and 1.43 [1.36-1.50] per 1 pack/day). Smoking cessation demonstrated a graded association with HF, with significantly increased risk even after cessation for ≥30 years (1.16 [1.04-1.31]) (Table-Model 2). After further adjusting for incident coronary events, the association was attenuated but remained significant up to cessation for 10-19 years (Table-Model 3).

Conclusions: All smoking parameters tested in this study consistently show significant associations with incident HF. The HF risk related to smoking lasted at least 19 years after its cessation. Our results further highlight the importance of smoking prevention and early smoking cessation for the prevention of HF.


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P156

Kidney Function and Serum Potassium as Predictors of Spironolactone Initiation in Congestive Heart Failure

Alex Secora, Jung-Im Shin, Yao Qiao, G. Caleb Alexander, Josef Coresh, Morgan Grams, Johns Hopkins Univ, Baltimore, MD

Introduction: There are a paucity of data on real-world spironolactone use among patients with congestive heart failure (CHF), and whether spironolactone initiation differs by kidney function and serum potassium. Hypothesis: Patients with reduced kidney function and elevated serum potassium are less likely to be prescribed spironolactone than patients with normal kidney function and serum potassium. Methods: We identified patient cohorts with incident CHF and available laboratory data in the Truven MarketScan Commercial Claims and Encounters database (MS) from 2010-2015 (N=22,881), and the Geisinger Health System Integrated Electronic Health Record (GHS) from 2004-2016 (N=17,470), and assessed medication use through prescription order and dispensing data, and comorbidities using ICD codes. We measured incidence, initial dose, and duration of incident spironolactone use, overall and by levels of kidney function and serum potassium. We used Cox proportional hazards regression models to quantify the association between measures of baseline and time-varying estimated glomerular filtration rate (eGFR) and serum potassium, and incident spironolactone use, adjusting for other medication use and comorbidities. Results: Among 22,881 incident CHF patients in the MS database, mean age at CHF was 54.3 (+8.7) years, 47.2% were female, and the mean eGFR was 78.9 ml/min/1.73m² (+21). The 17,470 incident CHF patients in GHS were older (74.0 years ±12.9), more likely to be female (51.5%), and have a lower mean eGFR (62.5 +24.3). Both cohorts had a mean baseline serum potassium of 4.3 mEq/L (+0.5). There were 1,341 (1,774) incident prescriptions for spironolactone over 34,384 (52,187) person-years in MS (GHS). Median starting dose was 25 mg in both cohorts. Women were less likely to start spironolactone in both cohorts, while older patients were less likely to start spironolactone only in GHS. Compared to patients with eGFR >90 ml/min/1.73m², those with eGFR <30 ml/min/1.73m² were less likely to initiate spironolactone in MS (hazard ratio [HR] = 0.57, 95% confidence interval [CI]: 0.38-0.84) and GHS (HR = 0.69, CI: 0.48-0.99). Patients with serum potassium <3.5 mEq/L were more likely to initiate spironolactone compared to those with 3.5-4.9 mEq/L (normal) in both cohorts (HR=1.99 [95% CI: 1.57-2.52] in MS; HR=2.70 [95% CI: 2.34-3.26] in GHS). Conclusion: Consistent with the labeled guidelines, patients with CHF and reduced kidney function were less likely to use spironolactone, while those with lower serum potassium levels were more likely to use spironolactone.


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P157

Association of Rurality With Death in Patients With Heart Failure: a Community Study

Sheila Manemann, Jennifer St. Sauver, Lila Finney Rutten, Matteo Fabbri, Alanna Chamberlain, Susan Weston, Ruoxiang Jiang, Veronique L Roger, Mayo Clinic, Rochester, MN

Background: Previous studies have indicated that living in a rural or non-urban area may be associated with poor health outcomes. However, data on rurality and death in heart
failure (HF) are scarce. Methods: Residents from 11 southeast MN counties with a first-ever code for HF (including codes ICD-9 428 and ICD-10 I50) between 1/1/2013 and 12/31/2016 were identified. Resident address was geocoded and classified according to the Rural-Urban Commuting Area (RUCA) codes, which classifies US census tracts to measure population density, urbanization and daily commuting. Rurality was defined as living in a non-metropolitan area. Cox proportional hazards regression was used to determine the association between living in a rural vs. urban area and death. Results: Among 6,996 patients (mean age 73 years, 52% male), 54% of patients lived in a rural area. These patients were older and had a lower level of educational attainment and comorbidity burden (p<0.001). After a mean (SD) follow-up of 2.9 (1.3) years, 1,856 deaths occurred. Living in a rural area was univariately associated with a higher risk of death (HR 1.20, 95% CI: 1.09-1.31; Table). After adjustment for age, sex, education status and comorbidity burden, rurality remained associated with an increased risk of death (HR 1.15; 95% CI: 1.04-1.27). Conclusions: Among patients with HF, living in a rural area is associated with an increased risk of death. Further study to identify and address the mechanisms through which rural residence influences mortality in patients with HF is needed.

Table. Hazard Ratios and 95% Confidence Intervals for the Association between Rurality and Death in Heart Failure

<table>
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<th>Urban (ref)</th>
<th>Rural (1.20 (1.09-1.31))</th>
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<td>Unadjusted</td>
<td>1 (ref)</td>
<td>1.20 (1.09-1.31)</td>
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<tr>
<td>Adjusted for age, sex and comorbidities</td>
<td>1 (ref)</td>
<td>1.19 (1.09-1.21)</td>
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<tr>
<td>Adjusted for age, sex, comorbidities and education status</td>
<td>1 (ref)</td>
<td>1.15 (1.04-1.27)</td>
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Depression After Cardiac Transplantation From 2012 to 2018 in a Reference Hospital in Recife: A Transversal Study

Evandro Cabral Brito, Univ of Pernambuco, Recife, Brazil; Ângela M Arcoverde, Pernambuco Health Coll, Recife, Brazil; Isabela A Martins, Mauricio de Nassau Univ Ctr, Recife, Brazil; Bárbara Cubits, Clarissa O Alves, Pernambuco Health Coll, Recife, Brazil; Verônica S Monteiro, Rodrigo M Carneiro, Fernando A Figueira, Professor Fernando Figueira Inst of Integral Med, Recife, Brazil

Introduction: Cardiac transplantation represents a treatment opportunity for cardiovascular diseases that are refractory to traditional methods. For the procedure’s success, the individual needs to be collaborative and remain surrounded by restrictions and intensive care even after its performance. Thus, the emotional burden that surrounds the process contributes to depression after the surgery. The impact of depression on one’s quality of life has been subject of research all over the world, but its value is not completely clarified after a heart transplantation.

Objective: To estimate the occurrence of symptoms of depression in 50 patients who underwent cardiac transplantation at the Institute of Integral Medicine Professor Fernando Figueira between 2012 and 2018.

Hypothesis: Depression was a frequent event after cardiac transplantation in the sample of this study.

Methods: A cross-sectional observational study using questionnaires adapted, translated and validated in Brazil, the Medical Outcomes Study 36- Item Short-Form Health Survey (SF-36) for quality of life assessment and the Beck II Depression Inventory (BDI-II), for evaluation of depression symptoms. The collection was performed at the Cardiac Transplant Outpatient Clinic of the referred hospital, through individual interviews. The data collected was entered in the program Microsoft Excel version 2010 and the Statistical Package for the Social Sciences - SPSS 13.0 Software for Windows was used. All tests were applied with 95%
confidence. This study is based on Resolution 466/2012 of the National Health Council. This research was approved in the Ethics Committee of the Institute of Integral Medicine Professor Fernando Figueira with CAAE n°66851517.7.0000.5201. **Results:** The sample consisted of 50 patients, 76% male (38 of 50), mean age of 47.76 years and 48% (24 of 50) had low education level. Data obtained by the application of BDI-II (n = 50) presented a mean of 13.36, median of 13.00, standard deviation of 12.76. Of the sample, 70% (35 of 50) were considered to have symptoms of depression, reaching scores with more than 9 points, the difference of genres being of little statistical significance. Among the variables related to the symptoms of depression, only the need for anxiolytic after transplantation was statistically relevant. In the comparison of the SF-36 with the 35 symptomatic patients for depression, of their eight scales only limitation by physical aspects and emotional aspects were not statistically relevant. **Conclusion:** The symptoms of depression could be verified in the sample with a significant impact on quality of life, when associated with functional capacity, pain, general health, vitality, social aspects and mental health. Patients who underwent heart transplantation should receive multidisciplinary care in order to minimize their vulnerabilities.

**Disclosures:**  

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P159

**Relationships Between Objectively Measured Physical Activity, Exercise Performance, and Quality of Life in Older Obese HFpEF Patients**

**Introduction:** Heart failure with preserved ejection fraction (HFpEF) is the most rapidly increasing type of heart failure. Markedly reduced exercise capacity (peak VO\(_2\)) is the primary manifestation of chronic HFpEF and impacts quality of life (QOL); however, its relationship to objectively measured physical activity (PA) levels is unknown. Accordingly, we prospectively measured PA, exercise performance, and QOL in older patients with chronic obese HFpEF. **Hypothesis:** PA levels would be low in obese HFpEF patients and would be strongly correlated with reduced exercise performance and QOL. **Methods:** Obese HFpEF patients ≥60 years old (N=58) wore Kenz Lifecorder EX accelerometers to obtain light PA (LPA), moderate-vigorous PA (MVPA), PA energy expenditure (PAEE), and steps. Peak VO\(_2\) and ventilatory anaerobic threshold (VAT) were assessed by cardiopulmonary exercise testing, and six-minute walk distance (6MWD) was assessed using the Guyatt method. QOL was assessed using the Kansas City Cardiomyopathy Questionnaire (KCCQ), Minnesota Living with Heart Failure Questionnaire (MLHF), and Short Form 36 (SF-36). Pearson correlations were performed to examine relationships between PA, exercise performance, and QOL. **Results:** Patients were 68.0±5.7 years old, 78% (45 of 58) female, 59% (34 of 58) white, obese (BMI 39.1±6.1 kg/m\(^2\)), and had predominantly NYHA class II symptoms (62%, 36 of 58). Patients had low PA levels with 33.4±12.6 min/day of LPA, 10.4±6.7 min/day of MVPA, 3785±1436 steps/day, and a PAEE of 147±57 kcal/day. Patients also had low exercise performance with peak VO\(_2\) of 14.4±2.7 ml/kg/min, VAT of 9.7±1.9 ml/kg/min, and 6MWD of 410±75 meters. LPA (r=0.32, p=0.014) and steps/day (r =0.30, p=0.022) were modestly correlated with peak VO\(_2\), but MVPA and PAEE were not. All PA
measures were moderately correlated with 6MWD (r=0.41-0.49, all p<0.002). None of the PA measures were correlated with any of the QOL assessments (KCCQ r=0.00-0.15, p=0.25-0.99; MLHF r=-0.13-0.00, p=0.33-0.99; SF-36 r=-0.05-0.11, p=0.41-0.70). **Conclusion**: Obese HFpEF patients had low levels of objectively measured daily PA and low exercise performance. Contrary to our hypothesis, PA levels were only modestly correlated with exercise performance including peak VO\textsubscript{2} and 6MWD. PA was not correlated with any assessment of QOL. This indicates that measures of PA, exercise capacity, and QOL assess different aspects of the patient experience in obese HFpEF and are largely independent of each other. While each remains a valid potential target for intervention, they should not be considered interchangeable.

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**P160**

**Racial Differences in the Association of NTproBNP With Risk of Incident Heart Failure in REGARDS Participants**

Nirav Patel, Univ of Alabama at Birmingham, Birmingham, AL; Mary Cushman, Larner Coll of Med at the Univ of Vermont, Burlington, VT; Orlando Gutiérrez, George Howard, Monika Safford, Paul Muntner, Raegan Durant, Sumanth Prabhu, Garima Arora, Emily Levitan, Pankaj Arora, Univ of Alabama at Birmingham, Birmingham, AL

**Background** Black individuals have lower N-terminal-pro-B-type natriuretic peptide (NTproBNP) levels than whites. Higher NTproBNP levels are associated with increased risk of incident heart failure (HF). Although, the ability of NTproBNP for risk stratification is variable in the setting of obesity and kidney disease. We studied the 1) association of NTproBNP with incident HF stratified by race and 2) tested the predictive ability across body mass index (BMI) and estimated glomerular filtration rate (eGFR) categories. **Methods** Using a case-cohort design, NTproBNP levels were measured from the Reasons for Geographic And Racial Differences in Stroke study for 855 participants who subsequently developed incident HF and 3,680 randomly selected participants. Multivariable Cox proportional hazard modeling including all the factors which can affect NTproBNP levels was used to assess 1) the association of NTproBNP with incident HF; 2) interaction by race, and 3) predictive ability of NTproBNP based on percentage contribution in global Wald Chi-square score across BMI and eGFR categories. **Results** The mean age of the random sub-cohort was 66.6 (12.1) years, 1,847 (50.2%) were females and 1,775 (48.2%) were blacks. The magnitude and strength of the relationship of NTproBNP with incident HF differed by race (p=0.01 for interaction). A doubling in NTproBNP levels was associated with greater risk of incident HF among whites ([hazard ratio (HR): 1.82; 95% CI: 1.62-2.04] compared with blacks (HR: 1.54; 95% CI: 1.35-1.75). NTproBNP remained a strong predictor (25%-50% Wald score) of incident HF across all BMI and eGFR categories in whites. However, among blacks with obesity (BMI ≥ 30 kg/m\textsuperscript{2}) and eGFR ≤60 ml/min/1.73 m\textsuperscript{2}, NTproBNP was a weak predictor of incident HF (<7% Wald score) (**Figure**). **Conclusions** Higher NTproBNP was more strongly associated with incident HF among whites compared with blacks. The predictive ability of NTproBNP levels with incident HF was preserved with obesity.
and impaired renal function among whites, but not in blacks.

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P161

Accelerometer-Measured Physical Activity and Heart Failure Incidence in Women Ages 63-99 Years: The OPACH Study

Michael J LaMonte, Univ at Buffalo, Buffalo, NY; John Bellettiere, Univ of California, San Diego, CA; Charles B. Eaton, Brown Univ, Providence, RI; Marcia L Stefanick, Stanford Univ, Stanford, CA; Andrea Z. LaCroix, Univ at California, San Diego, CA

Background: The burden of heart failure (HF) is increasing in older adults, yet optimal treatment options are not available. Therefore, prevention efforts are paramount to population HF control. Physical activity (PA) has been associated with lower HF incidence, however few studies have evaluated older women and none have measured PA using accelerometry. We prospectively examined 6,173 multiethnic (White, 49%; Black, 34%; Hispanic, 17%) women ages 63-99 (mean 78.6) without known HF at baseline in the Objective Physical Activity and Cardiovascular Health Study. **Methods:** Vector magnitude counts/15-sec epoch from hip worn Actigraph GT3X+ triaxial accelerometers (required ≥4 of 7 days with ≥10 hr/day wear time) were used to define time spent in light (LPA; 19-518 counts/15-sec), moderate-to-vigorous (MVPA; ≥519), and total (average VM counts across wear days) PA. Count cutpoints were determined from a calibration study among similarly aged women. Incident HF cases were ascertained by self-report annually and were adjudicated by medical record review. Cases of hospitalized acute decompensated HF were included here. Cox regression was used to estimate hazard ratios (HR) and 95% confidence intervals (CI) for these associations. **Results:** There were 213 (3.5%) incident HF cases identified during a mean 4.5 year follow-up. Crude HF rates (per 1000 person-years) across PA tertiles were 13.2, 5.7, and 4.9 for total PA; 12.3, 5.4, and 5.8 for light PA; and 14.8, 6.1, and 3.3 for MVPA. After adjusting for awake wear time, age, race, ethnicity, smoking, comorbidities including CHD, diabetes and hypertension, and self-rated health, the HR comparing the highest to lowest tertile was 0.61 (0.42, 0.89) for total PA, 0.69 (0.48, 0.98) for light PA, and 0.39 (0.25, 0.59) for MVPA. After adjusting for these covariates and for PA intensity, among all women the HR for a 30-min/day increment in light PA was 0.93 (0.88, 0.99) and in MVPA was 0.73 (0.59, 0.88). Similar magnitudes of inverse associations with HF risk for light PA and MVPA were seen in women <80 and ≥80 years of age, and in women with low physical function (SF36 score <60) and with higher function (≥60). Inverse associations with HF for light PA and MVPA also were seen in white (HR = 0.94 and 0.78), black (HR = 0.92 and 0.58) and Hispanic (HR = 0.97 and 0.65) women, and in those who were obese (BMI ≥30; HR = 0.93 and 0.81) and not obese (HR = 0.93 and
0.54), although HRs across these stratum were more variable. Results among all women were materially the same after discarding HF cases occurring during the first year of follow-up.

**Conclusions:** Greater levels of accelerometer-measured total, light intensity and moderate-to-vigorous intensity PA were associated with lower incidence of HF in older community-living women. These findings underscore the potential public health relevance of being physically active in later life for primary HF prevention.

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**P162**

**Gout and Risk for Incident Heart Failure, Coronary Heart Disease and Stroke: The REasons for Geographic And Racial Differences in Stroke (REGARDS) Study**

**Lisandro D Colantonio,** Kenneth G Saag, Jasvinder Singh, Richard Reynolds, Angelo Gaffo, Univ of Alabama at Birmingham, Birmingham, AL; Timothy B Plante, Dept of Med, Larner Coll of Med at The Univ of Vermont Medical Ctr, Burlington, VT; Jeffrey R Curtis, S Louis Bridges, Emily B Levitan, Ninad Chaudhary, George Howard, Univ of Alabama at Birmingham, Birmingham, AL; Monika M Safford, Dept of Med, Weill Cornell Medical Coll, New York, NY; Paul Muntner, Marguerite Ryan Irvin, Univ of Alabama at Birmingham, Birmingham, AL

**Background:** Gout has been associated with a higher risk for coronary heart disease (CHD) and stroke in some but not all prior studies. There are few data available on the risk for incident heart failure associated with gout. **Objective:** To compare the incidence of heart failure, CHD and stroke among adults with versus without gout. **Methods:** We used data from 5,499 black and white REasons for Geographic and Racial Differences in Stroke (REGARDS) study participants >65 years of age with Medicare coverage without a history of heart failure, CHD or stroke at baseline in 2003-2007. Gout was defined by (1) ≥1 inpatient claim or ≥2 outpatient or carrier claims on separate days with an ICD-9 diagnosis code for gout (274.x) in Medicare prior to each participant’s baseline study visit, or (2) use of allopurinol, colchicine or probenecid based on a baseline medication inventory. REGARDS study participants were followed through December 31, 2015 for heart failure, CHD, and stroke events, which were adjudicated. **Results:** Among participants included in the current analysis (mean age 72 years, 45% male, 31% black), 223 (4%) had gout. The incidence of heart failure and CHD was higher, while the incidence of stroke was similar, among participants with versus without gout (Figure). After adjustment for sociodemographic and cardiovascular risk factors, hazard ratios comparing participants with versus without gout were 2.41 (95%CI 1.60, 3.64) for heart failure, 1.41 (0.96, 2.07) for CHD and 0.96 (0.58, 1.59) for stroke. There was no statistically significant effect modification by race or gender. In a sensitivity analysis defining gout only based on Medicare diagnosis codes, multivariable-adjusted hazard ratios for heart failure, CHD and stroke associated with gout were 2.25 (95%CI 1.41, 3.59), 1.26 (0.79, 1.99) and 0.83 (0.45, 1.52), respectively. **Conclusion:** After accounting for sociodemographic and cardiovascular risk factors, gout remains strongly associated with incident heart failure but not with incident CHD or stroke.
Sex-Based Differences in Cardiac Function, Biomarkers and Exercise Capacity Heart Failure With Preserved Ejection Fraction - Findings From the RELAX Trial

**Background:** The biological mechanisms underlying the higher burden of Heart failure with preserved ejection fraction (HFpEF) and associated worse clinical outcomes in women vs. men is not well-known.

**Methods:** In a cohort of patients with chronic stable HFpEF that were enrolled in the PDE-5 Inhibition to Improve Clinical Status and Exercise Capacity in Diastolic Heart Failure trial, sex-based differences in echocardiographic parameters, cardiac biomarkers, and directly measured peak exercise oxygen uptake (peak VO$_2$) were assessed using adjusted linear regression models that accounted for relevant confounders (Figure).

**Results:** Among the 214 study participants (49% women), there were no significant differences in measures of cardiac function such as stroke volume (38.1 v. 39.0 ml/m$^2$), diastolic function (E/A: 1.4 v. 1.5), and pulmonary artery systolic pressure (41 v. 43 mm Hg) among women vs. men in unadjusted and adjusted analysis. Women had significantly lower burden of chronic myocardial injury (hs-Troponin-I: 7.3 v. 11.4 ng/l, $p < 0.001$) and myocardial fibrosis (CTIP: 5.8 v. 6.7 ng/L $p = 0.02$) and comparable NT-ProBNP levels to men in unadjusted and adjusted comparisons (Figure). However, women had significantly lower measures of exercise performance as compared with men including lower peak VO$_2$ (10.8 vs. 13.3 ml/kg/min, $p < 0.01$), peak exercise work (60 vs. 83 Watts, $p < 0.01$), and anaerobic threshold (600 v. 795 ml/min) compared with men. These differences in exercise capacity persisted in adjusted analyses that accounted for demographics, clinical characteristics, measures of cardiac function and biomarkers, and, cardiac biomarkers, and exercise parameters (Figure).

**Conclusion:** Among stable patients with HFpEF, despite favorable comparable cardiac structure and function, and lower burden of chronic myocardial injury and fibrosis, women have worse exercise capacity as compared with men.
These differences in exercise capacity are not explained by differences in myocardial performance. <!--EndFragment-->

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**P164**

**Walking Pace is Inversely Associated With Heart Failure Risk in the Physicians’ Health Study**

**Omar Al-Ramady**, Brigham and Women's Hosp / VA Boston Healthcare System, Boston, MA; 
**Jiaying Chen**, Brigham and Women's Hosp, Boston, MA; **John Michael Gaziano**, Luc Djoussé, Brigham and Women's Hosp / VA Boston Healthcare System, Boston, MA

**Background**

Heart Failure (HF) continues to place a large burden on the public health. While previous studies reported a lower risk of HF and coronary heart disease with increased physical activity, limited data is known about the role of intensity and duration of exercise, specifically walking pace in relation to heart failure risk.

**Objective**

The primary objective is to assess whether walking pace is associated with a lower risk of heart failure among male US physicians.

**Methods**

In a prospective cohort study of US male physicians, walking pace was collected through a self-reported questionnaire. Incidence of HF was measured via self-reported annual questionnaires and validated in a subsample.

**Results**

We studied 21,345 men with a mean age of 67.6 ± 8.9 years. After a mean follow-up of 8.2 years, 849 cases of HF occurred. In a multivariable Cox regression adjust for age, exercise, prevalent CHD, history of atrial fibrillation, smoking and alcohol consumption, hazard ratios (95% CI) for HF were 1.08 (0.85-1.36) for walking pace of <2 mph, 0.73 (0.60-0.90) for 2-2.9 mph, and 0.55 (0.43-0.71) for ≥3 mph compared to not walking regularly (p trend <0.0001).

**Conclusions**

Walking Pace was inversely associated with HF in male physicians in a dose-response manner

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**P166**

**Subendocardial Viability Ratio Associates With Diastolic Function Parameters: Insights From the Bogalusa Heart Study**


**Introduction:** Recent evidence has linked coronary microvascular dysfunction to impaired diastolic function and severity in heart failure with preserved fraction (HFrEF). While echocardiography remains pivotal in the
assessments of this clinical scenario, information is scant on the role of applanation tonometry-derived estimates of coronary microcirculation, such as the subendocardial viability ratio (SEVR), in the evaluation of diastolic function.

**Hypothesis:** We hypothesized that SEVR is associated with diastolic function parameters in relatively young and healthy adults in a community setting. **Methods:** We examined 611 participants of the Bogalusa Heart Study (31.3% black, 54.6% female, aged 29 to 51 years) who underwent 2D and Doppler echocardiography as well as pulse-wave analysis via applanation tonometry of the radial artery. Echocardiographic parameters of diastolic function included mitral annular velocity (e'), peak early filling velocity (E), peak velocity cause by atrial contraction (A), isovolumic relaxation time (IVRT), and deceleration time (DT). Diastolic function and SEVR relationships were evaluated with multivariable-adjusted linear regression. Covariates adjusted for included age, race, sex, systolic blood pressure, high density lipoprotein cholesterol, low density lipoprotein cholesterol, serum triglycerides, glucose, body mass index, cigarette smoking as well as blood pressure and lipid medications. **Results:** Compared to men, women had a lower SEVR (p < 0.001). There were no significant sex or race differences in diastolic function parameters, except that black females had lower E/e' ratios compared to black males (p=0.003). SEVR was significantly associated with the E/A ratio (β=0.20, p<0.001) as well as DT (β=0.32, p<0.001), while no significant associations were found between SEVR and the E/e' ratio or IVRT. Neither sex nor race modified the relationship of SEVR with E/A ratio, DT, E/e' ratio, or IVRT. **Conclusion:** In middle-aged adults, SEVR is significantly associated with traditional echocardiographic parameters of diastolic function, including both the E/A ratio and DT. Pulse wave analysis via applanation tonometry is an inexpensive non-invasive tool that may aid in accelerating the diagnosis of diastolic dysfunction in the individuals without overt disease.


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**P167**

**Exergaming Experience: Perspectives of Patients With Heart Failure**

Marysol C Cacciata, Univ of California, Irvine, Irvine, CA; Lorraine Evangelista, Lorraine Evangelista, Irvine, CA

**Background:** Heart failure (HF) is a chronic illness that affects the physical and psychosocial well being of individuals afflicted with this debilitating disease. Physical activity in patients with HF is known to have positive outcomes. Exergaming is a new form of physical activity that has gained popularity among older adults and with older individuals with chronic illnesses. This home-based exercise platform has the potential to improve the physical activity in patients with HF. **Aims:** To explore HF patients perceived facilitators, attitudes and experiences when using an exergame platform at home utilizing the Nintendo Wii sports. This qualitative study was conducted as part of a larger study to determine feasibility and usability of using a home-based exercise program to improve the physical and psychosocial well-being in patients with HF. **Methods:** Semi-structured face to face interviews were conducted in 13 participants diagnosed with HF (5 women, age range between 35 and 67 years old). The participants were recruited at a university hospital HF clinic in Southern California. Participants were asked about their experience with exergames. Exergaming devices were installed in participants’ homes and they were given advice to use the devices a minimum of 30 minutes a day. The interviews evolved around themes such as acceptance of exergame, usefulness and
engagement. Transcribed interviews were analyzed with content analysis. Results: The exergame device was easy to use. The virtual reality environment appeared real. However, participants verbalized challenges with hand-eye coordination in playing some of the games. Not all participants felt improvement in their physical activity. Participants reported eagerness and fun with exergaming but engagement diminished overtime. Greater variation of exergames were identified to reduce monotony. Conclusion: This study provided insight on the value of home-based exercise platform using technology in improving the physical activity of participants with HF. Participants’ perceptions of usefulness, acceptability and engagement are warranted to ensure that exergaming will achieve the intended aim of improving physical activity and ultimately improve the overall well being and health care delivery in this patient population.

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P168

Vascular Stiffness in Young Men Subject to Presence of Chronic Decompensated Tonsillitis

Maria Evsevyeva, Mikhail Eremin, ElenaITYantseva, Vladimir Koshel, Stavropol State Medical Univ, Stavropol, Russian Federation

The main role in atherosclerotic damage of the vascular wall is given now to the inflammatory process, the development of which is facilitated by a variety of risk factors (RF). Many of these factors begin to affect on the cardiovascular (CV) system in youth and even in childhood. Some authors refer to RF infectious-inflammatory diseases (IID), which were transferred earlier. The aim is to evaluate some parameters of vascular status in young people in the presence of such focal infection (FI) as chronic decompensated tonsillitis (CDT).

Material and methods. Within the main group, 52 young patients aimed at performing surgery due to the presence of IID (age from 18 to 27 years) were examined. 76 persons of comparable sex, age and profile of the main RF without any IID were served as control. The control group was formed from the number of students according to the results of the annual preventive examination in the framework of the Federal Program "University of healthy lifestyle". Both groups were quite comparable in age, sex and profile of the main RF. In addition to the assessment RF-profile it was carried out the determination of indicators of the central pressure and vascular stiffness with the help of hardware-diagnostic complex BPLab ("Petr Telegin", Nizhny-Novgorod, Russia) with the use of programs set Vasotens Office. This program involves an in-depth contour analysis of the properties of pulse waves at the level of both the aorta and peripheral arteries. Statistical processing was carried out using the software "Statistica 10.0" (StatSoft Inc, USA). Results. It was found that in the main group compared with the control group, the pulse wave propagation velocity in the aorta PWVao equal to 10.61±0.25 versus 9.73±0.15 m/s (p=0.004), the augmentation index in the aorta Alxao was 3.88±0.31 versus -1.04±0.08%. In discussing two groups augmentation index in the brachial artery Alx made up of 32.15±2.70 against -48.89±1.52% (p=0.05), arterial augmentation index, Alx normalized to heart rate heart rate was equal to -35.23±vs -49.67 of 5.39±2.56%. In this case, the values of both peripheral and aortic SBP, DBP, Medium BP and Puls BP in patients with DHT were slightly lower than in persons of the control group. Conclusion. The data of the youth study of the dense-elastic vascular potential in different parts of the arterial bed showed a marked increase in vascular rigidity from both the peripheral arteries and the aorta in presence of CDT. In this case, aortic remodeling was more pronounced. It is useful to consider these findings in process of planning and
implementing individualized prevention programmes among young people, taking into account the availability of FI.

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P169

The Impact of Perceived Cardiovascular Risk on Cardiovascular Prevention Behaviors in People Living With HIV

Allison R Webel, Frances Payne Bolton Sch of Nursing, Cleveland, OH; Jackson Currie, Cleveland Clinic Fndn, Cleveland, OH; Christine Horvat Davey, Julie Schexnayder, Hamed Al Battashi, Frances Payne Bolton Sch of Nursing, Cleveland, OH; Christopher Longenecker, Harrington Heart and Vascular Inst, Univ Hosp, Cleveland Medical Ctr, Cleveland, OH

Objective: To examine whether HIV status influences knowledge, beliefs and perception of risk for cardiovascular disease (CVD) and how this influences CVD prevention behaviors (exercise, diet, and adherence to preventative CVD drug therapy).

Methods: We conducted a cross-sectional study of HIV infected and demographically similar uninfected adults ≥ 30 years of age. Participants completed a self-reported survey on CVD risk perceptions, a self-reported CVD medication adherence survey, and three dietary intake interviews to assess overall diet quality. All wore an ActiGraph accelerometer for 7-10 days to measure physical activity. Wilcoxon rank-sum and t-tests were used to analyze the differences between groups and multiple linear regression was used to analyze the extent to which perceptions were associated with CVD prevention behaviors.

Findings: Overall, 191 (105 HIV-infected and 86 HIV-uninfected) persons participated. Participants were on average 54 years old, 58% male, and 81% African American without difference by group (all p>0.05). People living with HIV (PLHIV) engaged in significantly less moderate-to-vigorous physical activity (median 0 vs 34 minutes per week, p=0.006). However, participants had similar, but poor, overall diet quality (overall Healthy Eating Index score 45.14), and similar smoking rates (56.5%), statin use (51%) and blood pressure medication use (50%; p for all comparison >0.05). PLHIV reported significantly better adherence to CVD prevention medications (94 vs 68%, p<0.001).

There were no differences in perceived CVD risk between the two groups (p >0.05). In age and sex-adjusted models, HIV status was positively associated with medication adherence (p<0.001), and the interaction of HIV status and perceived severity of CVD were inversely associated with physical activity (p<0.05).

Conclusion: Overall, PLHIV were more likely to adhere to CVD prevention medications than well-matched HIV-uninfected adults and less likely to engage in moderate-to-vigorous physical activity in this study. However, this difference in physical activity is attenuated among those who perceive higher risk from CVD. Interventions targeting perceived CVD susceptibility and severity may help to increase physical activity in this population.


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P170
Etiologies and Characteristics of Heart Failure for Human Immunodeficiency Virus (HIV)-Infected Persons and Uninfected Controls

Abdul A. Abutaleb, Northwestern Univ - Feinberg Sch, Chicago, IL; Alexandra B. Steverson, Univ of California - San Francisco, San Francisco, CA; Faraz S. Ahmad, Donald M. Lloyd-Jones, Matthew J. Feinstein, Northwestern Univ - Feinberg Sch, Chicago, IL

Background:
Human immunodeficiency virus (HIV) is associated with elevated risks for heart failure (HF). No studies to our knowledge have evaluated physician-adjudicated etiologies of HF (e.g., ischemic vs. non-ischemic) for HIV-infected persons in the modern ART era.

Hypothesis:
We hypothesize that non-ischemic etiologies of HF will comprise a greater proportion of overall HF for HIV-infected than uninfected persons.

Methods:
We performed a nested study of a cohort of HIV-infected and uninfected persons frequency-matched on age, sex, race, zip code of residence, and clinic location receiving care at an urban medical center between 1/1/2000 and 1/1/2018. Two trained MDs independently reviewed clinical notes, imaging and laboratory studies to determine contributing etiologies of HF for 128 patients (75 HIV-infected, 53 uninfected) with physician-adjudicated HF. Laboratory and imaging data as well as clinical notes from clinical care were used to classify etiologies of HF. HF was considered ischemic in etiology based on any prior angiogram demonstrating ≥70% epicardial coronary stenosis, stress testing consistent with ischemia, and/or documented previous myocardial infarction. Non-ischemic heart failure etiologies were subtyped based on pre-specified criteria as valvular, inflammatory, drug induced, hypertensive, infiltrative, hypertrophic, dilated, tachycardia induced, pulmonary hypertension, acute pulmonary embolism, stress cardiomyopathy (Takotsubo), renal volume overload, cirrhotic volume overload, or unspecified. More than one etiology of HF was possible if criteria were met for multiple etiologies.

Results:
Age at HF onset, sex, and race of HIV-infected vs. uninfected persons with HF were similar. Diabetes was less common among HIV-infected (30.7%) vs. uninfected (54.7%; p = 0.01) persons with HF. There were no significant differences in the proportion of HIV-infected vs. uninfected persons with ischemic vs. non-ischemic etiology of HF. Within non-ischemic HF, drug/toxin-induced cardiomyopathy was more common among HIV-infected (17.3%) than uninfected (5.7%) persons (p= 0.049). The left ventricular ejection fraction (LVEF) at HF diagnosis was significantly lower for HIV-infected (37.6% ± 16.4%) than uninfected (44.9% ± 18.3%; p =0.02) persons. The difference was apparent among persons with non-ischemic etiologies (38.0% ± 16.7% vs. 47.9% ± 17.8% for HIV-infected vs. uninfected; p=0.01), but not for those with ischemic etiologies of HF (37.1% ± 15.9% vs. 38.3% ± 18.3% for HIV-infected vs. uninfected; p=0.83).

Conclusions:
HIV-infected persons with HF had lower LVEF at HF diagnosis and were more likely to have toxin/drug-induced HF etiology than uninfected persons with HF. Future studies are needed to understand etiologies of and prognosis HF among HIV-infected persons to inform prevention and treatment.


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P171

Effect of Intensive and Standard Clinic-Based Hypertension Management on the Concordance Between Clinic and Ambulatory Blood Pressure and Blood Pressure Variability:
Blood pressure (BP) varies over time within individual patients and across different BP measurement techniques. The effect of different BP targets on the concordance between BP measurements is unknown. The goal of this analysis was to evaluate concordance in: 1) clinic BP and ambulatory BP, 2) clinic visit-to-visit variability and ambulatory BP variability and 3) initial and repeat ambulatory BP. We also sought to evaluate whether treatment assignment of intensive vs standard BP target affected these relationships. The Systolic Blood Pressure Intervention Trial (SPRINT) ambulatory blood pressure monitoring ancillary study obtained ambulatory BP readings in 897 SPRINT participants at the 27 month follow up visit and 203 consecutive repeat ambulatory BP readings taken an average of 9.8 months later. There was poor agreement between clinic systolic BP and daytime ambulatory systolic BP (limits of agreement in Bland-Altman plots of -21 to 34 mm Hg in the intensive treatment group and -26 to 32 mm Hg in the standard treatment group). There was poor agreement between clinic visit-to-visit variability (coefficient of variation) and ambulatory BP variability (coefficient of variation of a 24 hr ambulatory BP) with correlation coefficients for systolic BP <0.16. While there was a high correlation between ambulatory BP at 27 months and repeat ambulatory BP (r =0.56), there was significant variability between repeat ambulatory BP assessments (limits of agreement of -27 to 21 mm Hg in the intensive group and -23 to 20 mm Hg in the standard group). In conclusion, irrespective of treatment target, we found low concordance in BP and BP variability between clinic BP and ambulatory BP, and additionally between repeat ambulatory BP assessments. These results reinforce the need for multiple guideline adherent BP measurements prior to clinical decision making.

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P172

**Association of Interleukin 6 With Hypertension in HIV Positive Participants in the Strategic Timing of Antiretroviral Treatment (START) Trial**

Lama Ghazi, Jason V Baker, Shweta Sharma, Mamta K Jain, Univ of Minnesota, Minneapolis, MN; Adrian Palfreeman, Univ of Texas Southwestern, Dallas, TX; Coca Necsoi, Div of Infectious Disease, Saint-Pierre, Belgium; Daniel Murray, Univ of South Washington, Minneapolis, WA; James D Neaton, Paul E Drawz, Univ of Minnesota, Minneapolis, MN

**Introduction:** The association between hypertension (HTN) and inflammation [e.g., estimated via interleukin 6 (IL-6)] in HIV positive persons who have a CD4+ count greater than 500 cells/mm³ has not been well established.

**Methods:** We studied HTN in the START trial, a randomized study of immediate vs. deferred antiretroviral therapy (ART) in HIV-positive adults who were ART naïve and had a CD4+ count greater than 500 cells/mm³. Our analysis included 4249 of the 4,684 HIV positive persons enrolled in START who had no history of cardiovascular disease and had IL-6 measured at baseline. HTN (prevalence at baseline or incidence) was defined as having a systolic BP ≥140 mm Hg, or a diastolic BP ≥90 mm Hg, or use of BP-lowering therapy. Logistic regression and discrete Cox proportional hazard models were used to test the association between IL-6 and HTN prevalence and incidence. Sensitivity analysis were used to test the association between systolic and diastolic BP and IL-6 levels.

**Results:** HTN was prevalent in 18.9% of the cohort at entry. The median age of participants was 36 years, 27% were female, median CD4+ cell count at entry was 651 cells/mm³ and median HIV RNA level was 13090 copies/mL. In univariate analysis, HTN was significantly associated with higher IL-6 levels at baseline [OR per doubling of IL-6:1.28, 95%CI (1.18, 1.39)]. This association was attenuated and no longer significant after adjusting for race, age, gender, BMI, diabetes, smoking, RNA and CD4+ levels [OR per doubling of IL-6:1.10, 95%CI (0.99, 1.20)]. The reduced OR was primarily due BMI and age, both which were strongly related to HTN. Overall incidence of HTN was 6.9 cases per 100 person year. Baseline IL-6 was not associated with risk of incident HTN in the crude and fully adjusted model [HR per doubling of IL-6:0.98, 95%CI (0.90, 1.10) in adjusted analysis]. This association did not differ by treatment group (p for interaction=0.21). Risk factors such as age, black race, BMI, and male gender were associated with incident HTN. Continuous systolic and diastolic BP were not significantly associated with IL-6 at baseline or in follow-up analyses.

**Conclusions:** IL-6 was not associated with HTN in HIV positive participants with CD4+ counts greater than 500 cells/mm³ after adjusting for factors known to be associated with HTN and inflammation. Furthermore, baseline IL-6 level was not associated with incident HTN, nor with continuous BP measures. Rather, HTN development was associated with traditional risk factors such as age, race, gender and BMI.


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Funding Component:

P173

**Blood Pressure Patterns in Young Adulthood Associated With Cardiovascular Disease and All-Cause Mortality by Middle Age: The CARDIA Study**
Objectives: In young adults, which blood pressure (BP) patterns, determined over multiple clinic visits, are most associated with future risk for cardiovascular disease (CVD) and all-cause mortality remains unclear. We determined BP patterns during young adulthood most associated with CVD events and all-cause mortality by middle age. BP patterns included average systolic BP (SBP)/diastolic BP (DBP) levels, cumulative exposure to SBP/DBP, visit-to-visit SBP/DBP variability, and average annual change in SBP/DBP. Methods: We analyzed data from the Coronary Artery Risk Development in Young Adults (CARDIA) Study, which enrolled 5115 adults aged 18-30 years from 1985-1986, with up to 30 years of follow-up (through 2015). BP patterns were evaluated with measurements at Year 0 [baseline], and 2, 5, 7, and 10 years following baseline. We estimated visit-to-visit BP variability as variability independent of the mean (VIM). Average annual change of BP from the Year 0 to Year 10 exams was calculated using linear regression. Cox proportional hazards models were used to assess the associations between BP patterns and adjudicated CVD events (coronary heart disease, stroke, heart failure, and other vascular disease) and all-cause mortality. Results: At Year 10, the mean±standard deviation (SD) age of the 3,394 participants was 35.1±3.6 years, 46% were African American, 56% were female, and only 3% were taking antihypertensive medication. Cumulative exposure to SBP and average SBP levels were highly correlated (Pearson’s correlation = 0.94). Over a median follow-up of 19.2 years, 162 CVD events and 181 deaths occurred. Average SBP and DBP levels and VIM of SBP were associated with increased CVD risk (see table), with no interaction by race or sex (each p>0.4). Only VIM of SBP was associated with all-cause mortality. Conclusions: Among young adults, the assessment of visit-to-visit SBP variability in addition to average SBP and DBP levels can help identify young adults who have an increased CVD risk and all-cause mortality by middle age.


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Funding Component:

P174

Stress and Depression Are Associated With Life’s Simple 7 Among African Americans With Hypertension: Findings From the Jackson Heart Study

Aisha T. Langford, Mark Butler, NYU Sch of Med, New York, NY; John N. Booth III, Univ of Alabama at Birmingham, Birmingham, AL; Adam Bress, Univ of Utah Sch of Med, Salt Lake City, UT; Rikki M. Tanner, Univ of Alabama at...
Birmingham, Birmingham, AL; Jolaade Kalinowski, Judite Blanc, Azizi Seixas, NYU Sch of Med, New York, NY; Daichi Shimbo, Columbia Univ Medical Ctr, New York, NY; Mario Sims, Univ of Mississippi Medical Ctr, Jackson, MS; Olugbenga Ogedegbe, Tanya M. Spruill, NYU Sch of Med, New York, NY

Introduction: The American Heart Association created the Life’s Simple 7 (LS7) metric to promote optimal cardiovascular health (CVH) via managing blood pressure (BP), controlling cholesterol, reducing blood sugar, getting active, eating better, losing weight, and quitting smoking. The degree to which psychosocial factors impact one’s ability to achieve LS7 recommendations is unclear. We hypothesized that hypertensive African Americans with high stress levels and high depressive symptoms would have poorer CVH compared to those with low stress and low depressive symptoms.

Methods: Cross-sectional analyses included 1,845 participants with hypertension from the Jackson Heart Study, a community-based cohort of African Americans. Hypertension was defined as clinic BP ≥140/90 mm Hg or self-reported use of antihypertensive medication at the baseline exam (2000-2004). Outcomes were the continuous LS7 composite score and individual components (each defined as poor, intermediate or ideal). The Weekly Stress Inventory was used to identify high stress (top quartile vs. all others). The Center for Epidemiologic Studies Depression (CES-D) scale was used to identify high depressive symptoms (CES-D ≥16 vs. <16). We examined associations between stress and depressive symptoms with composite LS7 scores and individual LS7 metrics. We compared four groups: (1) high stress alone, (2) high depressive symptoms alone, (3) high stress and high depressive symptoms, and (4) low stress and low depressive symptoms (reference). Models were progressively adjusted for age, sex, education, employment, insurance status, and cardiovascular risk factors.

Results: The mean age was 58.9 ± 10.8 years, 31% of participants were male, and 9.6% had both high stress and high depressive symptoms. Participants with both high stress and high depressive symptoms had a lower composite LS7 score than those with low stress and low depressive symptoms (6.0 vs. 6.5, p=0.004). The association was present after adjusting for demographic and socioeconomic factors (p=.029) but not in fully adjusted models (p>0.05). Neither high stress alone nor high depressive symptoms alone were associated with LS7 score in any model (p>0.05). Other key findings included significant associations between high stress and depressive symptoms and poorer levels of health for smoking (OR [95% CI]= 0.53 [0.34-0.81]) and physical activity (OR [95% CI]= 0.68 [0.50-0.94]) in fully adjusted models.

Conclusion: African Americans with the combination of high stress and high depressive symptoms had poorer overall CVH compared with those reporting low stress and low depressive symptoms, and were less likely to have ideal smoking and physical activity. Future studies should evaluate prospective effects of this psychosocial risk profile on CVH, which may inform behavioral approaches to improving CVH.


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P175

Association of Midlife Hypertension and a Novel Biomarker of Accelerated Epigenetic Age: Coronary Artery Risk Development in Young Adults (CARDIA) Study

Yinan Zheng, Sadiya Khan, Tao Gao, Brian Joyce, Sanjiv Shah, Northwestern Univ, Chicago, IL;
Introduction: Hypertension (HTN) is associated with increased risk of cardiovascular disease (CVD), a hallmark of aging. A new biomarker of epigenetic age using 513 DNA methylation and clinical biomarkers, referred to as phenotypic age, has been derived and validated. Phenotypic age acceleration (PhenoAA) is defined as the residual value of phenotypic age regressed on chronologic age, and is thus independent of chronologic age.

Hypothesis: We assessed the hypothesis that higher blood pressure is associated with greater PhenoAA.

Methods: A subset of CARDIA cohort participants (ppts) (n=957) underwent genome-wide blood DNA methylation profiling with the Illumina EPIC 850K array at Year 20 (Y20; age 38-54 years) for estimation of PhenoAA. Ppts with adjudicated CVD or cancer history or who were pregnant at Y20 were excluded (n=113). We used robust linear regression models to examine the association of systolic and diastolic blood pressure (SBP and DBP) with PhenoAA at Y20 after adjusting for age, sex, race, education, study center, BMI, smoking status, physical activity, and anti-hypertensive treatment. We also compared mean PhenoAA across three groups: no HTN (BP <130/<80), HTN controlled with treatment (BP <130/<80), and uncontrolled HTN (BP ≥130/≥80).

Results: Ppts were 48% female and 40% black with mean chronological age 45±4 years, and mean SBP 116±15 and DBP 73±11 mmHg. Phenotypic age was accelerated by 0.36 years per 10 mmHg higher for SBP (p=0.018, Figure A) but not for DBP. Compared with ppts with no HTN, those with controlled HTN had 1.8 years greater (P=0.044) and those with uncontrolled HTN had 3.2 years (P=0.0001) greater PhenoAA (Figure B); there was no significant difference between controlled and uncontrolled ppts with HTN.

Conclusions: PhenoAA is a promising molecular biomarker of aging associated with higher concurrent SBP levels, which reflect greater cumulative SBP exposure. These data suggest that controlling BP after onset of HTN may not fully reverse possible effects of cumulative BP exposure on aging.


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P176

Heart-Healthy Dietary Patterns Are Inversely Related to Hypertension Among Women With History of Preeclampsia: A Cohort Study in Mexico

OBJECTIVE Although history of preeclampsia increases a woman’s risk of developing hypertension (HTN) in adulthood, it remains unclear whether a heart-healthy post-pregnancy diet could ameliorate some of this risk. Therefore, we evaluated whether adherence to dietary patterns is related with HTN among women with prior preeclampsia.

METHODS At baseline, 4,781 women without HTN reported at least one pregnancy with preeclampsia in the 2008 Mexican Teachers’ Cohort follow-up cycle. From the baseline food frequency questionnaire (FFQ) we derived diet scores based on the American Heart Association (AHA) 2020 Goals and the Dietary Approaches to Stop Hypertension (DASH). The AHA score has 5 items: fruits and vegetables, fish, whole grain, sugar-sweetened beverages and sodium, whereas the DASH diet has 8: low-fat dairy, nuts/legumes, fruits, vegetables, whole grain, red and processed meats, sugar-sweetened beverages, and sodium. Incident HTN reported in 2011, was defined as high blood pressure diagnosed by a medical doctor or currently taking antihypertensive treatment. We estimated the relative risk (RR) and 95% confidence intervals (95%CI) of HTN by comparing women in the lowest score quintile to women in the highest score quintile, using log-binomial regression after adjusting for common risk factors for HTN as well as health care provider, demographic regions and indigenous heritage.

RESULTS The mean age (SD) of women affected by preeclampsia was 41(7) years and BMI of 28(5) kg/m². Over the 3-year study period, 555(12%) women developed incident HTN, which was higher that the incidence of HTN among women with normotensive pregnancies (6%). Women with the highest AHA scores had 0.82(95% CI 0.68,1.06) times the risk of developing HTN than women with lowest scores (p-trend=0.04). Similarly, highest adherence to the DASH diet had 0.74(95% CI 0.57,0.96) times the risk of developing HTN than women with the lowest score(p-trend=0.03). When individual components of the diet were separately evaluated, only sodium intake was associated with HTN. Specifically, women who consumed ≥2,500 mg/day of sodium had 1.18(0.92,1.52) times the risk of HTN compared to women who consumed <1,500 mg/day. Adherence to the AHA and DASH scores and sodium intake were also related to risk of HTN among 57,063 women without a history of preeclampsia; however the associations were weaker for highest adherence to AHA (RR 0.86 [95%CI 0.78,0.96]),DASH RR 0.87 [95%CI 0.78, 0.97]),and RR 1.13 [95% CI 1.01,1.26] for ≥2,500 vs. <1,500 mg/day of sodium.

CONCLUSION Greater adherence to AHA and DASH diet patterns were inversely related to risk of HTN among Mexican women with a history of preeclampsia and even though lower sodium intake was also related to HTN, the FFQ underestimates absolute sodium intake. Nevertheless, post-partum recommendations on diet quality in this high-risk group may provide one strategy to prevent long-term risk of HTN.


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P177
Hypertension is Considerably More Prevalent, Yet Decreasing Over Time According to the New Guidelines

Joyce E Rudy, The Ohio State Univ, Columbus, OH; Randi E Foraker, Washington Univ Sch of Med in St. Louis, St Louis, MO; Randall E Harris, Julie K Bower, The Ohio State Univ, Columbus, OH

Introduction: New High Blood Pressure (BP) Guidelines released by the American Heart Association (AHA) and the American College of Cardiology redefined hypertension, imparting implications for monitoring cardiovascular health (CVH). The impact on reclassification of patients according to electronic health record (EHR) data as a result of changes in criteria for BP cut points has not yet been described.

Hypothesis: We hypothesized that more stringent cut points for hypertension would increase the prevalence of United States (US) adults with poor CVH for BP.

Methods: We analyzed outpatient visit data recorded in The Guideline Advantage®, a repository of EHRs of patients from eight diverse healthcare systems in the US from 2012-2015. For each year, the first non-missing BP measurement for each patient was categorized into poor (hypertensive), intermediate (pre-hypertensive), and ideal (normotensive) for CVH, first in accordance with AHA’s Life Simple 7 guidelines, and then in accordance with the new guidelines. We compared overall trends with trends stratified by race and sex, in distributions of poor and intermediate categories, and in the proportion eligible for pharmacological treatment (BP ≥ 130/80).

Results: A total of 172,209 unique patients contributed 348,933 BP measurements, and most were female (58.63%) and white (75.09%). Although the prevalence of poor CVH for BP was consistently 3-fold higher under the new guidelines and the difference in prevalence was significant (p<0.0001), it decreased over time for the both the old (9.4% to 8.7%) and new (27.8% to 26.4%) guidelines. Over time, the proportion classified as hypertensive decreased (12.4% to 10.4 vs. 33.9% to 30.3%) for males and increased for non-whites (10.2% to 13.9% vs. 27.1% to 35.3%) from the old and new guidelines, respectively, but remained stable for females and whites. Similarly, the annual difference in the proportion of intermediate CVH for BP was significant (p<0.0001); however, pre-hypertension prevalence slightly increased under the old (57.9% to 58.5%) and new (39.5% to 40.7%) guidelines. Among untreated adults eligible for pharmacological intervention, the proportion remained relatively unchanged over time; in 2015, patients lacking treatment yet meeting treatment criteria was 23% and 7.3% under the new and old guidelines, respectively, resulting in a difference of 15.7% (p<0.0001). Whites (66.8%) and females (50.6%), compared with non-whites and males, respectively, comprised the majority.

Conclusions: Prevalence of poor CVH for BP among US adults substantially increases in the outpatient setting when categorizing measures with the new guidelines. Active participation by clinicians and public health practitioners are needed to address the higher prevalence of and disparities in both hypertension and treatment prescription identified with the old versus new guidelines.


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P178

Age-Related Gender and Ethnic Variations of Pulse Pressure and Pulsatile Stress

Sarina Sachdev, Landai Nguyen, Hassan Tahir, Bassam Omar, Farnoosh Rahimi, G. Mustafa Awan, Christopher Malozzi, Univ of South Alabama, Mobile, AL
Background: Aging causes significant widening of pulse pressure (PP), which has been associated with increased incidence of heart failure, especially diastolic with preserved ejection fraction (HFrEF). Pulsatile stress (PS; the product of PP and heart rate, HR) is a measure of the pulsatile load (per minute) on the cardiovascular system of the beat-to-beat PP, also associated with negative outcomes.

Methods: Encounters from university-based cardiology clinic with broad referral base were analyzed; 400 encounters were reviewed for PP and PS; with a total of 100 in each of the categories (WM, WF, AAM and AAF). Each group was individually analyzed for PP and PS in young patients (Young; < 60 years of age) versus old patients (Old; ≥ 60 years of age), using a Student’s t-test. PP is reported in mmHg, PS in mmHg/min (PP in mmHg x HR in beats per minute) and mean age in each category is reported in years.

Results: PP in Young WM (mean age 50; n = 41) was 48 ± 15 mmHg, and in Old WM (mean age 69; n = 59) was 55 ± 19 mmHg (7 mmHg difference; P = NS). PS in Young WM was 3395 ±1158 mmHg/min, and in Old WM was 3805 ± 1386 mmHg/min (410 mmHg difference; P = NS). PP in Young WF (mean age 52; n = 27) was 45 ± 9 mmHg, and in Old WF (mean age 70; n = 73) was 59 ± 21 mmHg (14 mmHg difference; P < 0.05). PS in Young WF was 3319 ± 891 mmHg/min, and in Old WF was 4159 ± 1486 mmHg/min (840 mmHg difference; P <0.05). PP in Young AAM (mean age 50; n = 47) was 51 ± 14 mmHg, and in Old AAM (mean age 70; n = 53) was 56 ± 17 mmHg (6 mmHg difference; P = NS). PS in Young AAM was 3623 ± 1102 mmHg/min, and in Old AAM was 3855 ± 1447 mmHg/min (232 mmHg difference; P = NS). PP in Young AAF (mean age 48; n = 42) was 50 ± 18 mmHg, and in Old AAF (mean age 68; n = 58) was 58 ± 21 mmHg (8 mmHg difference; P < 0.05). PS in Young AAF was 3760 ± 1441 mmHg/min, and in Old AAF 4043 ± 1638 mmHg/min (283 mmHg difference; P= NS).

Conclusion: The elderly suffer from mostly isolated systolic hypertension, with elevated pulse pressure, an independent predictor of cardiac events. Here, PP was higher in elderly compared with young patients, but the increase was significant only in females. PS was non-significantly changed with age in males. In females PS became non-significantly changed with age in AAF, but was statistically higher in older WF. These differences may help explain the increased incidence of HFrEF in older women compared to men and older white patients compared to blacks. The reason for this variation is unclear, but may be in part related to post-menopausal hormonal changes in older females. These observations are important as they identify significant gender and ethnic-related changes in pulse pressure and pulsatile stress with age affecting females, especially white females, who have elevated cardiovascular risk post-menopause.


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Funding Component:

P179

Hypertension Awareness is Associated With Negative Psychosocial Outcomes in Africans Americans in the Jackson Heart Study (JHS)

Mark Butler, Jolaade Kalinowski, NYU Langone Health, New York, NY; Daichi Shimbo, Columbia Univ, New York, NY; Mario Sims, Univ of Mississippi Medical Ctr, Jackson, MS; John N. Booth III, Univ of Alabama at Birmingham, Birmingham, AL; Adam P. Bress, Univ of Utah, Salt Lake City, UT; Rikki M. Tanner, Byron C. Jaeger, Univ of Alabama at Birmingham, Birmingham, AL; Samuel Fredericks, Brown Univeristy, Providence, RI; Gbenga Ogedegbe, Tanya M. Spruill, NYU Langone Health, New York, NY

Introduction: Although treating hypertension (HTN) reduces the risk of cardiovascular
disease, being aware of a HTN diagnosis may have unintended consequences, including psychological distress and poorer perceived health. We hypothesized that African Americans meeting criteria for HTN, who are aware of a HTN diagnosis, would report higher levels of stress and depressive symptoms and poorer perceived health than those who are unaware.

**Methods:** Our sample included 2,815 participants with HTN from the Jackson Heart Study, a community-based cohort of African Americans. HTN was defined as blood pressure ≥140/90 mm Hg or taking antihypertensive medication. Awareness of HTN was defined based on participants’ self-report of having been told by a health care provider that they had HTN or high blood pressure. Outcomes included depressive symptoms (Center for Epidemiologic Studies Depression score ≥16 vs. <16), chronic stress (Global Perceived Stress Scale, highest quartile vs. all others), weekly stress (Weekly Stress Inventory, highest quartile vs. all others) and self-rated health (poor or fair vs. good or excellent). Cross-sectional associations between HTN awareness and psychosocial outcomes were tested using multivariable Poisson regression with adjustment for age, sex, systolic blood pressure, diastolic blood pressure, antihypertensive medication, body mass index, comorbidities and health behaviors. Analyses were also stratified by recency of diagnosis (i.e., HTN diagnosed ≤3 vs. >3 years).

**Results:** The majority of participants (2,572, 91.4%) were aware of having HTN while 243 (8.6%) were unaware. Among the aware participants, 15.5% were diagnosed ≤3 years ago and 84.5% were diagnosed >3 years ago. Aware participants were older (60.2 vs. 57.9, p=.002) and more likely to be female (68.4% vs. 47.7%, p<.001) than unaware participants. In fully adjusted models, HTN awareness was associated with higher levels of chronic stress (RR=1.55, 95% CI=1.09-2.22, p=0.016) and lower self-rated health (RR=1.55, 95% CI=1.05-2.29, p=0.028), and was marginally associated with higher weekly stress (RR=1.70, 95% CI=1.00-2.86, p=.053) and depressive symptoms (RR=1.60, 95% CI=0.95-2.70, p=.081). Overall, results did not differ based on recency of HTN diagnosis, except for a stronger association between awareness and weekly stress in the subgroup diagnosed ≥3 years ago.

**Conclusions:** In a community-based sample of African Americans with HTN, participants who were aware of having a HTN diagnosis reported higher levels of stress and depressive symptoms and lower self-reported health compared to participants who were unaware. Prospective studies of the potential psychosocial consequences of diagnosing HTN are warranted, particularly in light of recent changes to BP treatment guidelines that result in an increased prevalence of HTN.


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**P180**

**Combined Effect of Income and Medication Adherence on Mortality in Newly Treated Hypertension: a Nationwide Study of 16 Million Person-years**

Hokyou Lee, Yonsei Univ Coll of Med, Seoul, Korea, Republic of; Jong Heon Park, Natl Health Insurance Service, Wonju, Korea, Republic of; Sungha Park, Hyeon Chang Kim, Yonsei Univ Coll of Med, Seoul, Korea, Republic of

**Introduction:** Low socioeconomic status and poor medication adherence are known to increase mortality among patients with hypertension, but their combined effects have not been well studied. **Hypothesis:** We hypothesized that excess risks for all-cause and cardiovascular deaths by medication adherence are greater in lower income individuals with
hypertension. **Methods:** We followed 1,679,527 persons, aged 30 to 80 years, with newly treated hypertension and no prior cardiovascular disease (CVD), for 10 years using the Korean National Health Insurance database. Exposure variables were household income in quintiles and medication adherence estimated by medication possession ratio: good (≥0.8), moderate (0.5 to <0.8), or poor (<0.5). Outcomes were all-cause and CVD-related deaths. We used Cox proportional hazards model to calculate hazard ratios (HR) adjusted for age, sex, comorbidity, and other covariates. **Results:** Both low income and poor adherence were independently associated with higher mortality (HR=1.51, 95% CI=1.49-1.54, lowest vs. highest income; HR=1.65, 95% CI=1.64-1.67, poor vs. good adherence). However, when stratified by combination of income and adherence (figure), excess risk by non-adherence gradually increased towards lower household income, especially in men. Excess risk for death by poor medication adherence was 117% (HR, 2.78 vs. 1.61, poor vs. good adherence) in lowest-income men and 59% in highest-income men. In women, risk difference by income was also present, but was not as prominent as in men. Excess risk for death by poor adherence was 75% (HR, 2.07 vs. 1.32, poor vs. good adherence) in lowest-income women and 54% in highest-income women. Similar findings were observed for CVD-related death also. **Conclusion:** Poor medication adherence is associated with higher mortality, but patients with low income are subject to greater excess risk by non-adherence. This highlights the potential importance of promoting adherence for risk reduction especially in low-income patients with hypertension.

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**P181**

**Young Adult Risk Factor Burden and Sleep Hypertension in Middle-Age: the Coronary Artery Risk Development in Young Adults Study**

John N Booth III, Univ of Alabama at Birmingham, Birmingham, AL; Joseph Schwartz, Columbia Univ, New York, NY; Norrina Allen, Northwestern Univ, Chicago, IL; Bryron Jaeger, Cora Lewis, James Shikany, Univ of Alabama at Birmingham, Birmingham, AL; Yuichiro Yano, Duke Univ, Durham, NC; YiYi Zhang, Daichi Shimbo, Columbia Univ, New York, NY; Paul Muntner, Univ of Alabama at Birmingham, Birmingham, AL; Andrew Moran, Columbia Univ, N, NY

**Introduction:** Developing cardiovascular disease (CVD) risk factors at younger ages increases the risk for clinic hypertension. Few data report if earlier exposure to CVD risk factors impacts blood pressure (BP) during sleep. **Hypothesis:** Test whether exposure to CVD risk factors in young adulthood predicts sleep systolic BP (SBP) and sleep hypertension status in middle age, independent of risk factor levels
in middle age.

**Methods:** In 1985-86, the Coronary Artery Risk Development in Young Adults study enrolled 5115 adults 18-30 years old. CVD risk factors (i.e., body mass index [BMI], fasting glucose, cigarette smoking, alcohol intake, albumin to creatinine ratio [ACR] and estimated glomerular filtration rate [eGFR]) were measured at nine exams over 30 years. We analyzed 781 adults with a complete 24 hour ambulatory BP monitoring (ABPM) recording in year 30 at 48-60 years old. Sleep hypertension was defined as asleep SBP ≥ 120 mm Hg or diastolic BP (DBP) ≥ 70 mm Hg on ABPM. To assess the importance of earlier exposure to CVD risk factors on sleep SBP in middle age, a likelihood ratio test was used to compare nested multivariable adjusted linear regression models with CVD risk factors measured at all exams (Model 1) and year 30 only (Model 2). Poisson regression was used for the sleep hypertension outcome.

**Results:** In year 30, the mean sleep SBP / DBP was 113 / 67 mm Hg; 41.1% of adults had sleep hypertension. Compared with CVD risk factors measured at year 30 only (Model 2), BMI, fasting glucose, cigarette smoking, alcohol intake, ACR and eGFR measured at all exams (Model 1) statistically significantly increased the explanatory value for higher sleep SBP in middle age (all p-values < 0.05; Table). With the exception of ACR (p=0.057), results were consistent for sleep hypertension.

**Conclusion:** Exposure to less healthy levels of CVD risk factors in young adulthood may independently contribute to higher sleep SBP and having sleep hypertension by middle age. Studies with repeated ABPM are needed to track determinants of higher sleep BP over the lifespan.

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**P182**

**Prescribing Blood Creatinine and Urine Protein Tests Lowered the Risk of Cardiovascular Disease in Patients With Hypertension: a Follow-up of 66,362 People Who Started Antihypertensive Treatment**

**Hyeon Chang Kim, Hokyou Lee, Sung Ha Park, Yonsei Univ, Seoul, Korea, Republic of**

**Introduction:** Hypertension treatment guidelines recommend the routine evaluation of target organ damage for better management of hypertension. However, many of the hypertension patients in Korea are not tested for their kidney complications. Hypothesis: We hypothesized that prescribing blood creatinine or urine protein tests is associated with the future risk of cardiovascular disease (CVD) in patients with hypertension. Methods: The National Health Insurance Service-Health Screening (NHIS-HEALS) cohort comprised a 10% random sample of Korean adults who were aged 40-79 years and completed national adult health screening in year 2002-2003 (n=514866). From the NHIS-HEALS cohort, we identified 66,362 patients who were diagnosed with hypertension and started antihypertensive treatment in 2003-2008. Exposures were prescriptions for blood creatinine test and urine protein test within one year of starting
antihypertensive treatment. CVD outcomes were hospitalization for myocardial infarction or stroke until the end of 2013. Cox proportional hazard models were used to calculate hazard ratio (HR) for CVD, after adjusting for sex, age, employment status, household income, Charlson comorbidity index, antihypertensive drug class, medication adherence, smoking, alcohol consumption, exercise, body mass index, systolic blood pressure before treatment, fasting glucose, and total cholesterol. Results: Among the 66362 patients, 37913 (57.1%) and 40361 (60.8%) were tested for blood creatinine and urine protein, respectively. Compared to patients who were tested, those who were not tested had significantly higher risk of CVD: adjusted HR was 1.15 (95% CI 1.05-1.28) for blood creatinine test and 1.19 (95% CI 1.07-1.31) for urine protein test. Compared to those who had both blood and urine tests, the risk of patient who had only one test was not different (adjusted HR 1.00, 95% CI 0.88-1.15) but the risk of patients who did neither of the tests was significantly higher (adjusted HR 1.22, 95% CI 1.10-1.37). Similar findings were observed in sex-specific analysis, but the association was more prominent in women than in men. Conclusion: These nationally representative data confirmed the importance of testing kidney complications in hypertension management and CVD prevention.

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P183

The Multiple Measurements of Urinary Sodium-to-Potassium Ratio Strongly Related With Home Hypertension: the Tohoku Medical Megabank Project Cohort Study

Mana Kogure, Takumi Hirata, Naoki Nakaya, Naho Tsuchiya, Tomohiro Nakamura, Akira Narita, Tohoku Medical Megabank Organization, Tohoku Univ, Sendai, Japan; Ken Miyagawa, Hiroshi Koshimizu, OMRON Healthcare Co., Ltd., Kyoto, Japan; Taku Obara, Tohoku Medical Megabank Organization, Tohoku Univ, Sendai, Japan; Hirohito Metoki, Tohoku Medical and Pharmaceutical Univ, Sendai, Japan; Akira Uruno, Tohoku Medical Megabank Organization, Tohoku Univ, Sendai, Japan; Masahiro Kikuya, Teikyo Univ Sch of Med, Tokyo, Japan; Junichi Sugawara, Shinichi Kuriyama, Atsushi Hozawa, Tohoku Medical Megabank Organization, Tohoku Univ, Sendai, Japan

Introduction: Recently, the balance between sodium and potassium intake, i.e. sodium-to-potassium (Na/K) ratio, has received a lot of attention for prevention of hypertension. Previous studies reported that the positive association between 24-hour urinary Na/K (uNa/K) ratio and hypertension. However, no studies have evaluated the relationship between uNa/K ratio measured by casual urine measurement and home hypertension in large populations. We aimed to clarify whether casual uNa/K ratio using the self-monitoring device was associated with home hypertension in general population. In addition, we assessed whether multiple days measurement of uNa/K ratio by casual urine increase the accuracy of the prediction of home hypertension compared with casual urine collected in a single day.

Hypothesis: We assessed the hypothesis that multiple measurement of uNa/K ratio was positively associated with home hypertension, and increase the prediction of home hypertension compared with a single measurement.

Methods: The subjects were over 20 years old who participated in The Tohoku Medical Megabank Project Cohort Study. Of these participants, we targeted 2,551 subjects who borrowed home blood pressure monitors (HEM-7080IC) and uNa/K ratio monitors (HEU-001F) for continuous 10 days. To assess the relationship between casual uNa/K ratio and home hypertension, we performed multiple
logistic regression analyses and calculated aOR with 95% CI. We included covariate factors as age, sex, BMI and drinking status. In addition, to compare the prediction of home hypertension in multiple measurement with that in a single measurement, we calculated area under the ROC curve (AUROC) of uNa/K ratio. Home hypertension was defined as a SBP ≥ 135 mmHg and/or a DBP ≥ 85 mmHg.

**Results:** Among 849 subjects had home hypertension (33.3%). Although uNa/K ratio was even positively associated with home hypertension by a single day (P for trend <0.01, aOR of home hypertension increase per quartile =1.11), the relationship between uNa/K ratio of multiple measurement and home hypertension was more robust (aOR of more than 5 days: 1.23 to 1.25). Similarly, AUROC of uNa/K ratio measurement for home hypertension in 5 days was larger than that in a single day.

**Conclusions:** In conclusion, even single measurement of uNa/K ratio was positively associated with hypertension, the multiple measurement of uNa/K ratio strongly related with home hypertension. We suggested that multiple measurement of uNa/K ratio is desirable for assessing home hypertension because long term measurement of uNa/K ratio might reflect participants’ dietary balance of Na/K ratio.

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**P184**

**2017 ACC/AHA Blood Pressure Classification and Cardiovascular Risk by Sex and Age: a 10-year Follow-up of 17.7 Million Koreans**

**Hokyou Lee,** Sungha Park, Hyeon Chang Kim, Yonsei Univ Coll of Med, Seoul, Korea, Republic of

**Introduction:** The ACC/AHA has lowered the definition of high blood pressure (BP) in 2017 with emphasis on individual risk assessment. However, in clinical settings without feasible risk calculation tools, it is unclear whether such BP classification alone can accurately stratify cardiovascular disease (CVD) risk across various demographic groups. **Hypothesis:** We hypothesized that CVD risks according to ACC/AHA BP categories differ by sex and age subgroups. **Methods:** We followed 17 714 343 persons, who underwent national health screening and had no prior CVD, for 10 years using the Korean National Health Insurance database. BP was classified by ACC/AHA definitions. Stage 1 and 2 hypertensions were further subcategorized into narrower systolic and diastolic BP (SBP/DBP) intervals. Outcome was the first CVD event (myocardial infarction and/or stroke). We used multivariable Cox proportional hazards model, stratified by sex
and age subgroups, to calculate hazard ratios (HR) according to BP categories. **Results:** Effect of high BP on CVD risk varied significantly by sex and age, with greater relative hazards in women and in younger ages (figure). Elevated BP was associated with higher CVD risk, compared with normal BP, in both sexes of age 20-69, but the association was no longer significant after age 70. Among stage 1 or 2 hypertension, CVD risks significantly diverged when the ACC/AHA category was divided into narrower SBP/DBP intervals. For instance, in men of age 50-59, HRs for SBP/DBP <120/80-89, 120-129/80-89, 130-139/<80, and 130-139/80-89 mmHg—all of which are stage 1 hypertensions—were 1.09, 1.20, 1.41, and 1.43, respectively. Similar trends were seen for both sexes, but there was a greater divergence of HRs toward higher pulse pressure in men and in older ages. **Conclusion:** Effect of high BP on CVD risk varies significantly by sex and age, and heterogeneous risk groups may coexist in the same ACC/AHA BP category. Therefore, an individual-level risk calculation tool is crucial for precise risk assessment in persons with high BP.

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Alcohol Consumption and Cardiovascular Disease Mortality in Adults With Hypertension Following the 2017 Blood Pressure Guidelines

Angelique G Brellenthin, Duck-chul Lee, Iowa State Univ, Ames, IA; Xuemei Sui, Steven N Blair, Univ of South Carolina, Columbia, SC

**INTRODUCTION:** Approximately half of adults have hypertension (HTN) under the 2017 blood pressure (BP) guidelines. The guidelines recommend lifestyle factors, such as limiting
alcohol consumption, to manage BP, although safe levels of alcohol consumption have not been investigated for this new population with HTN. **OBJECTIVE:** To examine the dose-response associations of alcohol consumption and cardiovascular disease (CVD) mortality in 29,499 adults (45±10 years) with HTN defined as systolic/diastolic BP ≥130/80 mmHg or physician diagnosis. **METHODS:** Participants received a preventive medical examination during 1974-2003 and were without CVD, cancer, or abnormal electrocardiogram at baseline. Participants self-reported the number of standard alcoholic beverages they consumed per week on a medical history questionnaire. Participants were classified into 5 groups: non-drinkers and sex-stratified quartiles of weekly drinks based on no significant interaction by sex. Non-drinkers with a previous history of alcohol use problems were excluded to minimize a potential selection bias. Mortality follow-up was through 2003 using the National Death Index. Cox regression models included baseline age, sex, examination year, smoking status, body mass index, meeting the aerobic physical activity guidelines, and parental CVD. Models were further adjusted for cardiorespiratory fitness (CRF; in METs).

**RESULTS:** During a mean follow-up of 14.5 years, 672 CVD deaths occurred. Quartiles of alcohol consumption were 1-3, 4-7, 8-14, ≥15 drinks per week for men and 1-2, 3-4, 5-9, ≥10 drinks per week for women. Compared with non-drinkers (23%; 6,756 of 29,499), the hazard ratios (95% confidence intervals) for CVD mortality among quartiles of drinking were 0.71 (0.54-0.92), 0.73 (0.58-0.92), 0.76 (0.60-0.98), and 0.84 (0.67-1.05) after adjusting for potential confounders. After additional adjustment for CRF, the HRs were 0.75 (0.58-0.98), 0.79 (0.62-0.996), 0.82 (0.65-1.05) and 0.90 (0.72-1.13) for CVD mortality compared with non-drinkers. We found similar trends for CVD mortality after adjusting for fasting glucose, resting systolic and diastolic BP, total cholesterol, diabetes, and hyperlipidemia. We also found similar results in subgroups of men and women, young (<60 years) and old (≥60 years), and normal weight (<25 kg/m²) and overweight/obese (≥25 kg/m²) individuals. Similar trends were observed for all-cause mortality, although the associations were attenuated in all quartiles of drinking both before and after adjusting for CRF. **CONCLUSIONS:** The risk of CVD mortality was lower in light-to-moderate (quartiles 1-3) alcohol drinking in adults with HTN although these associations became weaker after adjusting for CRF. These results suggest a potential confounding effect of CRF on the association between alcohol consumption and CVD mortality that should be considered for future studies.

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**Comparison of Hypertension Prevalence, Treatment, and Control Among African Immigrants and African Americans in the US**

Danielle S. Mensah, Natl Inst of Allergy and Infectious Disease, Bethesda, MD; Yvonne Commodore-Mensah, Kathryn Foti, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Ruth-Alma Turkson-Ocran, Nishit Patel, Cheryl Dennison Himmelfarb, Johns Hopkins Sch of Nursing, Baltimore, MD; Elizabeth Selvin, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD

**Introduction:** African immigrants make up a growing share of Blacks in the US. However, little is known about their cardiovascular health because data are combined with African Americans, despite cultural, socioeconomic, and genetic differences. **Hypothesis:** There will be significant differences in hypertension prevalence, treatment, and control between samples of African immigrants and African
Americans. **Methods:** We included participants in the African Immigrant Health Study, a community-engaged study of African immigrants in Baltimore-Washington, D.C. Participants ≥ 30 years old were recruited from community groups and religious institutions from 2017-2018. They were English-speaking and born in West Africa. We compared them to a weighted sample of African Americans who were ≥ 30 years old from the 2015-2016 NHANES. We used t-test and chi-squared tests to compare hypertension prevalence, treatment, and control between the groups.

**Results:** We compared 326 African immigrants (mean age 46; 60% women) to 928 African Americans (mean age 51; 56% women). African immigrants (60%) were more likely to have ≥ college education than African Americans (22%). African Americans (87%) were more likely to be insured than African immigrants (58%) and less likely (12%) to report a household income of ≥ $100,000 than African immigrants (21%). Age-standardized hypertension prevalence was higher in African Americans than African immigrants (Table). However, among those with hypertension, African Americans were more likely to be treated and controlled. Both groups had similar high rates of overweight/obesity; diabetes prevalence was higher in African Americans.

**Conclusions:** Hypertension prevalence among African immigrants was lower than African Americans. Hypertension treatment and control rates were lower in African immigrants and this may be due to poor healthcare access. Future studies may further elucidate reasons for differences among Black ethnic groups in hypertension prevalence, treatment, and control.

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- **Dennison Himmelfarb:** None. E. Selvin: None.

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**P187**

**The Associations of White Coat and Masked Hypertension With Cardiovascular Disease and Mortality in the Jackson Heart Study**

**Rikki M Tanner,** John Booth III, Univ Alabama at Birmingham, Birmingham, AL; Yuichiro Yano, Duke Univ, Durham, NC; Olugbenga Ogedegbe, New York Univ, New York, NY; Laura P Cohen, Columbia Univ, New York, NY; Swati Sahuja, Bharat Poudel, Univ Alabama at Birmingham, Birmingham, AL; Donald Clark III, Univ of Mississippi Medical Ctr, Jackson, MS; Emily O’Brien, Duke Univ, Durham, NC; Eyal Shahar, Univ of Arizona, Tucson, AZ; Mario Sims, Adolfo Correa, Univ of Mississippi Medical Ctr, Jackson, MS; Joseph Schwartz, Daichi Shimbo, Columbia Univ, New York, NY; Paul Muntner, Univ Alabama at Birmingham, Birmingham, AL
Introduction: The 2017 American College of Cardiology/American Heart Association (ACC/AHA) blood pressure (BP) guideline uses lower clinic and out-of-clinic BP thresholds to define hypertension compared to previous US guidelines. Using these thresholds, we determined the associations between white coat hypertension (WCH) and masked hypertension with cardiovascular disease (CVD) events and mortality. Methods: We included 993 African Americans participating in the Jackson Heart Study who had clinic BP measured during their baseline study visit between 2000 and 2004 and underwent ambulatory blood pressure monitoring (ABPM). We defined normotension, WCH/white coat effect (WCE), masked/masked uncontrolled hypertension, and sustained hypertension using clinic BP and mean awake BP on ABPM (Table). CVD events (i.e., coronary heart disease and stroke; n=107), and all-cause mortality (n=185) were adjudicated from baseline through December 2014 and December 2016, respectively. Results: The mean age of participants was 59 years and 68% were female. Among those not taking antihypertensive medication, 38% had normotension, 27% had WCH, 33% had masked hypertension, and 31% had sustained hypertension. WCH, masked hypertension, and sustained hypertension were each associated with an increased risk for CVD and mortality compared to normotension (Table). Among those taking antihypertensive medication, 26% had controlled normotension, 25% had a WCE, 45% had masked uncontrolled hypertension, and 39% had treated sustained hypertension. Masked uncontrolled hypertension was associated with a higher risk for CVD and a lower risk for mortality compared to controlled normotension. WCE was not associated with CVD events or all-cause mortality. Conclusions: According to the ACC/AHA BP guideline, WCH and masked hypertension are common among African American adults. ABPM could have an important role in guiding antihypertensive medication initiation and intensification to reduce CVD and mortality risk among African Americans.


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P188

Cluster Analysis of Systolic Blood Pressure Trajectories Before and After Initiation of Antihypertensive Therapy

David R. Gagnon, Yuk-Lam Ho, Jacqueline P. Honerlaw, J. Michael Gaziano, VA Boston Healthcare System, Boston, MA; Peter W.F. Wilson, Atlanta VA Medical Ctr, Decatur, GA; Luc Djousse, Kelly Cho, VA Boston Healthcare System, Boston, MA

Background: Responses to new antihypertensive therapy (AHT) can differ. Cluster analysis of longitudinal systolic blood pressure (SBP) data allows identification of individuals with similar trajectories, which enables hypothesis generation to potentially explain the observed patterns. We examined electronic health data from U.S. Veterans initiating AHT from 2002-2009.

Methods: SBP was tracked for 1 year before and up to 2 years after AHT initiation. Subjects were clustered using a K-means approach with the

<table>
<thead>
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<th>White Coat Hypertension</th>
<th>Masked Hypertension</th>
<th>Sustained Hypertension</th>
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P188
mean of the squared Euclidean distances as a distance metric and evaluated for the optimal number of clusters. Thin-plate splines were used to display the smoothed trajectories of each group with predicted SBP measures over time.

Results: A total of 45,598 subjects contributed 783,852 SBP measurements. Five clusters of subjects with similar trajectories were produced, providing visualization of SBP [Figure 1] prior to initiation, immediately after starting therapy, and after longer treatment duration. For example, Group 1 had the lowest mean age, lowest HDL-C, lowest LDL-C, highest triglycerides, lowest baseline SBP, lowest insulin use, and highest statin use.

Conclusions: Trajectory clustering for SBP identifies distinct response groups that differ in response to therapy, laboratory measures, and medication use. Future analyses can examine anti-hypertensive medication use, compliance and genetic factors to identify potential causes for these trajectories. These cluster analyses can provide new analytical approaches related to risk factor diagnosis and treatment.

Blood Pressure Control Among Older Adults - Results From the Atherosclerosis Risk in Communities Study

Kathryn Foti, Lawrence J Appel, Kunihiro Matsushita, Silvia Koton, Keenan Walker, Josef Coresh, Elizabeth Selvin, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD

Introduction Recent ACC/AHA guidelines recommend systolic blood pressure (SBP) treatment to <130 mmHg among adults ≥65 with hypertension, though treatment goals for older adults are controversial. Examining SBP levels and associated characteristics among a community-based sample of older adults should increase our understanding of contemporary hypertension management.

Hypothesis Among adults ≥65 with hypertension (BP ≥140/90 mmHg or on treatment), those with higher socioeconomic status and physical and cognitive functioning are more likely to meet the ACC/AHA SBP goal (<130 mmHg). It is uncertain whether comorbidities are associated with higher or lower SBP.

Methods We conducted a cross-sectional analysis at ARIC visit 5 which took place in 2011-2013; all participants were ≥65. We examined hypertension prevalence and the proportion of adults meeting different SBP goals overall and by demographic, lifestyle, and clinical factors. We used Poisson regression with robust variance to estimate prevalence ratios for SBP <130 mmHg.

Results Overall, 74.2% of 5,537 participants had hypertension. Among those with hypertension, 44.2% had SBP <130, 19.6% had SBP 130-<140, 18.2% had SBP 140-<150, and 18.1% had SBP ≥150 mmHg. The prevalence of SBP <130 mmHg was inversely related to age (Table, see adjusted prevalence ratio). Men, whites in Washington County, MD, those with higher income, overweight or obesity, diabetes, kidney disease, or cardiovascular disease were more likely, while blacks in Jackson, MS and those with probable dementia were less likely to have SBP <130 mmHg.


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P189
Conclusions Over 40% of participants met the ACC/AHA SBP goal. Only those in the highest income category were more likely to meet the goal. Those with comorbidities were more likely to meet the goal, which may reflect greater health care seeking, more intensive management, or BP-lowering comorbidities, such as heart failure. Our study highlights the burden of hypertension but shows SBP <130 mmHg has been achieved in a substantial proportion of older adults.

Table. Systolic Blood Pressure Levels and Prevalence Ratio of Systolic Blood Pressure <130mmHg.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>SBP &lt;130 mmHg</th>
<th>SBP ≥130 mmHg</th>
<th>p-value</th>
<th>Adjusted prevalence ratio</th>
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</thead>
<tbody>
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<tr>
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<tr>
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<tr>
<td>Health behaviors</td>
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<tr>
<td>Income</td>
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</tbody>
</table>

Background
Although associations between hypertension in mid-life and the development of dementia and cognitive decline have been established, the impact of the new 2017 ACC/AHA guidelines on dementia risk at the population level has not been evaluated.

Objectives
To assess the association of hypertension categories with the risk of incident dementia and to calculate the population attributable fraction (PAF) for dementia from hypertension categories according to the 2017 ACC/AHA guidelines, and compare these associations with hypertension defined according to JNC7.

Methods
We studied dementia-free participants recruited to the Atherosclerosis Risk in Communities (ARIC) cohort in 1987-89. Hypertension was defined by 2003 JNC7 and 2017 ACC/AHA guidelines using blood pressure measured at baseline; participants using antihypertensive medication were included in hypertension stage 2 for both sets of guidelines. Dementia was defined using adjudicated consensus diagnoses at visit 5 (2011-13), informant telephone interviews, and ICD-9 codes from hospitalizations and death certificates through 2013. Cox proportional hazards regression models estimated hazard ratios (HR) and 95% confidence intervals (CI) by hypertension categories, adjusting for potential confounders, including sociodemographic, lifestyle and clinical variables. PAF of dementia by hypertension category was calculated using rate ratios from Poisson regression and the

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prevalence of the risk factor in the population.

Results
Among 13,971 participants followed for a median of 23.0 years, 1381 cases of dementia were identified. Prevalence of elevated BP (systolic BP [SBP] 120-129 and diastolic BP [DBP] <80), hypertension stage 1 (SBP 130-139 or DBP 80-89) and hypertension stage 2 (SBP >140 or DBP >90) according to 2017 ACC/AHA categories was 13%, 15% and 44%, respectively. Corresponding HR (95%CI) compared to normal BP were 1.35 (95%CI 1.12, 1.61), 1.28 (1.07, 1.52) and 1.36 (1.18, 1.57), respectively. PAF (95%CI) of dementia from hypertension categories were 3% (1%, 5%), 3% (1%, 5%) and 9% (4%, 14%). PAF using JNC7 categories were similar to 2017 ACC/AHA: 6% (3%, 9%) for prehypertension (SBP 120-129 or DBP 80-89), 0% (-2%, 2%) for hypertension stage 1 (SBP 140-159 or DBP 90-99), and 9% (5%, 13%) for hypertension stage 2 (SBP >160 or DBP >100).

Conclusions
Risk of dementia was increased across categories defined by the new ACC/AHA hypertension guidelines. However, the population impact on dementia incidence using 2017 ACC/AHA was similar to the impact of JNC7. These results suggest that the new criteria for diagnosis of hypertension will not increase the number of persons in whom hypertension could be reasonably labeled as a risk for dementia.


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P191

Birth Weight and Risk of Hypertension: A Mendelian Randomization Study of 183433 Individuals from 60 Studies

Yan Zheng, State Key Lab of Genetic Engineering, Human Phenome Inst and Sch of Life Sciences, Fudan Univ, Shanghai, China; Tao Huang, Dept of Epidemiology and Biostatistics, Sch of Public Health, Peking Univ Health Science Ctr, Beijing, China; Tiange Wang, Shanghai Inst of Endocrine and Metabolic Diseases, Rui Jin Hosp, Shanghai Jiao Tong Univ Sch of Med, Shanghai, China; Zhendong Mei, State Key Lab of Genetic Engineering, Human Phenome Inst and Sch of Life Sciences, Fudan Univ, Shanghai, China; Xiang Li, Lu Qi, Dept of Epidemiology, Sch of Public Health and Tropical Med, Tulane Univ, New Orleans, LA

Importance: Epidemiology studies suggested that low birth weight is associated with a higher risk of hypertension in later life. However, little is known about the causality of such associations.

Objective: To evaluate the causality of the association between low birth weight and hypertension risk in later life.

Design, Setting, and Participants: We collected data from 60 studies with 183,433 participants (CHARGE-BIG consortium), and each study analyzed the data following a standard analytic protocol. We applied a Mendelian randomization analysis using a genetic risk score of low birth weight from seven SNPs as the instrumental variable to explore the possible causal association between birth weight and adulthood hypertension.

Main Outcomes and Measures: Hypertension was defined as systolic blood pressure of 140 mmHg or higher, diastolic blood pressure of 90 mmHg or higher, or current use of antihypertensive medication.

Results: A total of 70,874 hypertensive participants and 61,933 normotensive controls provided study-level data. In the meta-analysis, each additional risk allele in the risk score was associated with a 0.02 SD decrease in birth weight (p <0.05). Decreased birth weight was associated with a higher risk of hypertension in adults (odds ratio per 1 SD decrease in birth weight: 1.19, 95% confidence interval [CI]: 1.08 to 1.31), while no association was found
between a genetic risk score of low birth weight and hypertension risk. The formal Mendelian randomization analysis suggested genetically instrumented birth weight was not associated with risk of hypertension (instrumental odds ratio for causal effect per 1 SD decrease in birth weight: 0.94, 95%CI 0.62 to 1.42). These findings were consistent across different strata of sex, body mass index, or race.

Conclusions: Our findings suggest that the association of birth weight with hypertension from observational studies could be the result of confounding.

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P192


So Mi J Cho, Yonsei Univ Coll of Med, Seoul, Korea, Republic of; Hyeon Chang Kim, Dept of Preventive Med, Yonsei Univ Coll of Med, Seoul, Korea, Republic of

Background
Data from the Korean National Health and Nutrition Examination Survey (KNHANES) indicate that among individuals with hypertension, 62.5% (10,204 of 16,327) are treated and the control rates differed significantly by sociodemographic factors. Such discrepancy is owed to different risk factors and biological mechanisms associated with elevated systolic and diastolic blood pressures. Therefore, we investigated temporal trends of differential blood pressure control rate by sex and age in Korean population.

Methods
We identified 7,774 men and 8,553 women with hypertension from the 2007-2015 KNHANES, a cross-sectional and nationally representative survey of Korean civilian population. Three separate types of control rates were separately calculated for systolic (SBP-only), diastolic blood pressure (DBP-only) and systolic and diastolic blood pressures (S&DBP) among subjects with and treated for hypertension. To clarify, SBP-only control rate indicates subjects with controlled SBP yet elevated DBP and vice versa for DBP-only control rate. Control rates were compared across time by sex and age groups. Then, we used multivariate logistic regression to delineate factors associated with each type of control rate.

Results
In total, SBP-only, DBP-only, and S&DBP control rates were 18.0%, 23.7% and 41.6% among subjects with hypertension (2,939, 3,869 and 6,792 of 16,327), and 5.6%, 19.2% and 62.5% (571, 1,959 and 6,378 of 10,204) among those treated for hypertension, respectively. Over time, decrease in SBP-only control rate was compensated by subsequent improvements in combined control rate and accompanied by increase in DBP-only control rate in both sexes. Men aged 30-39 years with hypertension had the highest SBP-only control rate, 69.5% (472 of 679) which decreased by the older age groups. Inversely, DBP-only control rate was the highest among 70+ years group, 36.6% (701 of 1,917) and declined by younger groups. Men treated for hypertension showed similar results. Less age-gradient results were shown in women. SBP-only control rate among women with hypertension was the highest in 30-39 years group, 59.3% (109 of 184) and decreased by older groups. However, among women treated for hypertension, there was no negative linear trend by age group. Similarly, unlike its male counterpart, DBP-only control rate showed no visible trend by age group among women with hypertension, but only among those treated for hypertension: the highest in
70+ years group, 29.0% (749 of 2,579) and declining by younger age group. Results from multivariate logistic regression adjusted for sociodemographic and lifestyle factors were in agreement with trends observed above.

Conclusions
Separate examination of SBP and DBP control rates demonstrated different sex- and age-differential trends, which would’ve been overlooked in and can also explain temporal changes of combined blood pressure control rate.

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The Use of Antihypertensive Drugs, But Not Optimal Blood Pressure Level Was a Predictor of Endothelial Dysfunction in Hypertensives: From Multicenter Prospective Observational Study: FMD-J Study

Chisa Matsumoto, Hirofumi Tomiyama Tomiyama, Akira Yamashina, Taishiro Chikamori, Tokyo Medical Univ, Tokyo, Japan

Background The predictors of endothelial dysfunction, the initial marker of the development of atherosclerosis, have not been fully clarified. One previous observational study suggested that antihypertensive treatment in hypertensives may be associated with better endothelial function. However, it is not known whether antihypertensive treatment is associated with endothelial function independent from blood pressure level. The objective of this study is to evaluate the association of the use of antihypertensive drugs and blood pressure with endothelial function in the multicenter prospective observational study, FMD-J study. Methods 685 hypertensive subjects (mean age 62 ± 9 years) in the FMD-J study were followed for 3 years. Endothelial function was evaluated by flow mediated dilation (FMD). The FMD and the conventional risk factors for cardiovascular disease (CVD) were measured at the baseline and the end of the 3-year study period. We defined endothelial dysfunction as continuation of FMD > 4% for 3 years. Also, normal endothelial function was defined as continuation of FMD > 7 % for 3 years. Multivariate logistic regression analysis adjusted for established CVD risk factors were performed to assess the associations of antihypertensive treatment and endothelial dysfunction / normal endothelial function. We also evaluated whether the class of antihypertensive drugs was associated with endothelial function. Results 155 subjects had endothelial dysfunction and 71 subjects had normal endothelial function. The multivariate logistic regression analysis revealed that the use of antihypertensive drugs was associated with lower risk of endothelial dysfunction with odds ratio (OR) (95% CI) of 0.20 (0.50-0.86, P=0.03), independent of blood pressure. The use of antihypertensive drugs was also significantly associated with increase of normal endothelial function with OR of .6.28 (2.86-13.80, P > 0.001). In contrast, controlling of systolic blood pressure to optimal blood pressure level (&lt;130 mm Hg) was associated with neither endothelial dysfunction nor endothelial function. This association was not altered, even when subjects’ systolic blood pressure was controlled to &gt; 120 mm Hg. Among the class of antihypertensive drugs, only calcium-channel-blockers, ACE-inhibitors, and ARBs were associated with endothelial function, but diuretics and beta-blockers were not associated with endothelial function. Conclusion The use of antihypertensive medication, but not optimal blood pressure control was associated with lower risk of endothelial dysfunction in hypertensives. This association seemed to be only limited in calcium-channel-blockers, ACE-inhibitors, and ARBs. Further investigation why the use of antihypertensive drugs was associated with endothelial function independent of blood pressure level, may
provide valuable insights into prevention of CVD.

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**Associations of Bone Mineral Density With Blood Pressure and Obesity in Hong Kong Chinese Adults**

**Yao Jie Xie**, Alice Yuen Loke, The Hong Kong Polytechnic University, Hong Kong, Hong Kong; Suzanne C. Ho, Marc Ka-chun Chong, The Chinese Univ of Hong Kong, Hong Kong, Hong Kong

**Background** There were conflicting results regarding the association between blood pressure (BP) and bone mineral density (BMD) in previous studies. Obesity, often co-existing with high BP, may explain the discrepancy in those findings. The aim of this study was to examine the association between BP and BMD in Hong Kong Chinese adults, and to determine whether the relationship between BP and BMD differed in subjects with and without obesity.

**Methods** Eight hundred and one adults aged from 45 to 86 years were recruited at two outpatient clinics in Hong Kong. Data of weight, height, waist circumference, BP, disease diagnosis were extracted from medical records at the clinics. The femur neck total BMD (g/cm²) was measured by dual-energy X-ray absorptiometry (DXA). The demographics, smoking, drinking, and other covariates were collected by a self-administered questionnaire. Osteoporosis, osteopenia, and normal bone mass were classified by BMD T-score for analysis. **Results** The average systolic BP was 121.5 mmHg, 123.2 mmHg, and 126.9 mmHg, diastolic BP was 71.9 mmHg, 72.6 mmHg, and 75.8 mmHg among osteoporosis, osteopenia, and normal bone mass groups, respectively. Subjects with osteoporosis had lowest BP level (all P<0.01). In the multiple linear regression analysis, after adjustment of age, gender, BMI, cancer, diabetes, and chronic renal failure, higher systolic BP was associated with higher BMD (B=0.00078, 95%CI: 0.00020 to 0.00136, P<0.01). This association was significant in both males and females (both P<0.05). No significant association was observed between diastolic BP and BMD (P>0.05). When subjects were stratified by obesity status, the non-obese (BMI<25) subjects had a lower BMD for a given level of systolic BP (B=0.00064, 95%CI: 0.00006 to 0.00128, P<0.05), whereas the association was no longer significant among obese (BMI≥25) subjects (P>0.05). **Conclusion** Unlike most previous studies, we found a positive association between systolic BP and BMD, which higher systolic BP predicted higher BMD. This association was not significant in obese subjects but existed in non-obese subjects, indicating more studies are needed to explore the mechanisms of BP and obesity on the changes of BMD.

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**P195**

**Systolic Blood Pressure and 8-Year Mortality in Community-Dwelling Older Adults. Does Frailty Modify This Effect?**

Kaj Kremer, Ulrike Braisch, Geriatric Ctr Ulm Alb-Donau, Ulm, Germany; Dietrich Rothenbacher, Inst for Epidemiology and Medical Biometrics, Ulm, Germany; Michael Denkinger, Dhayana Dallmeier, Geriatric Ctr Ulm Alb-Donau, Ulm, Germany
Introduction: The current literature does not provide sufficient evidence to support different treatment targets for hypertension in older adults.

Hypothesis: The effect of systolic blood pressure (SBP) on 8-years mortality may vary by frailty status in community-dwelling older adults.

Methods: A frailty index (FI) was constructed according to the model of deficit accumulation with 38 items from the baseline exam at the Activity and Function in the Elderly Study. Each item had a score from 0 (no deficit) to 1 (deficit). FI represents the sum of all scores divided by 38. Cox-proportional hazards models adjusted for age, sex, education, smoking, diastolic blood pressure (DBP) and antihypertensive medications analyzed the association between SBP and 8-year mortality, evaluating the presence of effect modification by frailty.

Results: A total of 940 participants were included in the analysis [median age 74, interquartile range (IQR 70.1, 81.0), 42.4% women]. The prevalence of hypertension was 54%, with median SBP 144.5 mmHg (IQR 135.0, 150.0), and median DBP 78.5 mmHg (IQR 71.0, 86.5). Median follow-up time was 8.1 years. A total of 201 deaths were observed. The median FI was 0.113 (IQR 0.069, 0.113), with 19.9% (n=187, 79 deaths) being identified as frail (FI 0.2). We detected effect modification by frailty (p-value interaction term <0.05). Table 1 summarizes the hazard ratios for the multivariable adjusted models stratified by frailty.

Conclusions: Our results suggest the presence of effect modification by frailty with a possible protective effect of elevated SBP in frail subjects with respect to 8-year mortality even after adjustment for DBP and antihypertensive treatment.
region, 33 barbers participated in the BROTHERS program and completed a total of 4,926 blood pressure screening encounters of 4,301 individuals (97.6% (n= 3943) black; 71.14% (n=3060) male; mean age= 35.67, SD=13.92). Also 26 churches participated in the DACH program and completed a total of 2,658 blood pressure screening encounters of 1,987 individuals (94.5% (n=1877) black; 65.2% (n=1295) female; mean age= 52.62, SD=16.43).

Results: Barbers screenings showed that 51.84% (n=1688) of men were pre-hypertensive while only 10.81% (n=352) had normal blood pressure. Among all, 16.2% (n=738) participants reported never having their blood pressure checked. Among men, 1,216 (37.34%) had hypertension while 26.8% (n=326) were currently taking blood pressure medications, 37.9% (n=459) were current smokers, 31% (n=375) had no insurance coverage and 46.7% (n=566) had no personal doctor. DACH screenings showed that 42.3% (n=842) of participants were pre-hypertensive and 40.46% (n=804) had hypertension. Among hypertensive participants, 63.8% (n=513) were aware of the high blood pressure status and 58.3% (n=469) were currently taking medications for high blood pressure.

Conclusion: Health is determined in part by access to social and economic opportunities as well as the resources and support in communities. Because of the innovative health initiatives underway in the Mississippi Delta region, a new story is unfolding. Community based screenings help people to become familiar with their health status, educate them on various methods of prevention and intervention and help them to change their lifestyle to have a healthier life. Each healthy step taken is one towards improved health and prosperity not only for our state, but for the entire country.

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18-month intervention were assessed: medication adherence score, medication adjustments (addition of new medication or dose titration), waist circumference, physical activity, fruit and vegetable consumption, sodium consumption, and alcohol consumption. Generalized estimating equations were used to compare changes in potential mediators between intervention groups. Path analytic models were used to test single-mediator and multiple mediator indirect intervention effects using the Lavaan package in R statistical software. Mediation was considered significant at p<0.10.

**Results:** All potential mediators were significantly improved in the intervention group compared to the control group. Fruit and vegetable consumption, medication adherence, physical activity, and salt consumption are each significant mediators accounting for 4.3, 3.8, 3.3, and 3.2%, respectively, of the intervention effect in single-mediator models. The multiple mediation model explained 15.5% (1.3 mm Hg) of the total intervention effect. Changes in fruit and vegetable consumption and medication adherence remained significant mediators in multiple mediation analysis, responsible for 3.8% and 4.3% of the net reduction in systolic BP, respectively. Other potential mediators did not account for a significant proportion of the intervention effect.

**Conclusions:** Increases in medication adherence and fruit and vegetable consumption were responsible for the largest proportions of the explained intervention effect.

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**P198**
Small HDL-C is Associated to Subclinical Hypothyroidism. The Brazilian Longitudinal Study of Adult Health (ELSA-Brasil)

Isabela M Bensenor, Alessandra C Goulart, Marcio S Bittencourt, Univ of Sao Paulo, Sao Paulo, Brazil; Michael Blaha, Steven Jones, Johns Hopkins Univ, Baltimore, MD; Peter P Toth, Univ Illinois, Sterling, IL; Paulo A Lotufo, Univ of Sao Paulo, Sao Paulo, Brazil

Introduction: Although epidemiologic studies have associated subclinical thyroid disorders with coronary heart disease, the role of lipoprotein levels are not well defined as a mediator or moderator of this association.

Purpose: To test the association of lipoprotein particle concentration and size measured by nuclear magnetic resonance with subclinical hyperthyroidism and subclinical hypothyroidism using baseline data from the Brazilian Longitudinal Study of Health (ELSA-Brasil) of apparently healthy 5024 men and women aged 35 to 74 years old.

Methods: We measured lipids and lipoproteins subfractions using a new nuclear magnetic resonance spectroscopy (NMR LipoProfile® test spectra, LabCorp, Raleigh, NC): triglyceride-rich lipoprotein particles (TRLP, containing IDL-P and VLDL-P), 3 LDL-P subclasses (large, medium and small) and 3 HDL-P subclasses (large, medium and small). Subclinical thyroid disorders were defined as TSH >4 IU/ml and TSH <0.4 IU/ml for people with normal free-thyroxine levels. We excluded from the sample participants reporting previous cardiovascular disease, those who used lipid-lowering medications and/or other drugs that interfere with thyroid function remaining 3,947 subjects. The cross-sectional relationship between subclinical thyroid diseases (independent variable) and lipids and lipoproteins (dependent variable) were evaluated by linear regression models using euthyroid subjects as the reference. Models were presented as crude and after adjustment for sociodemographic (age, sex, race, and education), cardiovascular risk factors (body-mass index, hypertension, diabetes, smoking...
habit, alcohol use, and physical activity) and LDL-C, HDL-C and triglycerides measured by enzymatic methods. Results: After exclusions, we detected 47 persons with subclinical hyperthyroidism (mean age 53.1 (±9.4 years; 61.7% women), 258 with subclinical hypothyroidism (mean age 52.3 (±8.9); 58.1% women) and 3,642 participants with normal thyroid function (mean age: 50.1 (±8.6); 52% women). After multivariate adjustment, subclinical hyperthyroidism was associated with a decrease in triglyceride-rich lipoprotein particles (Beta coefficient (B) -15.2; P=0.04) and with the very small triglyceride-rich lipoprotein subclass (B, -16.9; P=0.04). Subclinical hypothyroidism was associated with a decrease in small HDL-P subclass (B, 0.42; P=0.03). No association was found for any subclinical conditions with LDL-C. Conclusions: Subclinical hyperthyroidism does not show any possible association with an atherogenic profile, and subclinical hypothyroidism revealed an association with lower small HDL-cholesterol levels.


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P200

Unsaturated Fat Replacing Carbohydrate or Protein Affects Protein-Based HDL Subspecies of Different Functionality

Bo Zhang, Barry Guglielmo, Jeremy D Furtado, Frank M Sacks, Harvard Univ, Boston, MA

Introduction: HDL is a heterogeneous group of protein-lipid complexes comprised of stable subspecies defined by their protein content whose functions and associations with cardiovascular disease (CVD) are likely driven by their proteome. The Optimal Macronutrient Intake Trial to Prevent Heart Disease (OMNI Heart) found that unsaturated fat replacing carbohydrate or protein increased HDL cholesterol, but nothing is known about the effect of macronutrient composition on HDL subspecies concentrations. Hypothesis: Dietary unsaturated fat (UNSAT) replacing carbohydrate (CARB) or protein (PROT) affects protein-based HDL subspecies. Methods: The OMNI Heart Trial employed a randomized cross-over design that fed sequentially each of three study diets emphasizing CARB, PROT, or UNSAT to the participants. The apolipoprotein (apo) A1 concentrations of 16 HDL subspecies, selected to represent the major functions of HDL, were measured in plasma samples from 141 participants collected after 4 weeks on each diet. Results and Conclusions: UNSAT replacing CARB or PROT affected the levels of different HDL subspecies involved in lipid metabolism, anti-oxidation, anti-inflammation, and homeostasis (figure). UNSAT replacing PROT increased HDL that contains apoC1, apoL1, PON1, or plasminogen. UNSAT replacing CARB increased HDL that contains apoC1 and HDL that contains apoE, an HDL subspecies associated with protection against CVD. PROT replacing CARB decreased HDL that contains apoE. UNSAT replacing CARB or PROT increased HDL cholesterol, total apoA1, and HDL that contains apoA2, as expected. In conclusion, macronutrients affect HDL subspecies that vary in their functionality, which may contribute to the effects of dietary inventions on the risk of cardiovascular and other diseases.
Increased risk for atherosclerosis. In the postprandial state circulating lipids consist of dietary fat transported from the intestine, by chylomicrons (containing ApoB48) and fat transported from the liver, in very low-density lipoproteins (VLDL, containing ApoB100). Research into the roles of endogenous versus dietary fat has been hindered because current methods are inadequate to fully separate these particles. Specifically, chylomicron fractions have considerable contamination from VLDL.

**Hypothesis**

We hypothesized that the generation of resin crosslinked to specific ApoB100 antibodies unique to VLDL would allow purification of chylomicron particles. Proof-of-principle experiments will determine: 1) individual contributions of newly synthesized fatty acids (de novo lipogenesis (DNL)), to triglycerides found in VLDL and chylomicrons; and 2) the proportion of labeled acetyl-CoA (precursor-pool value (PPV)) used to synthesize new palmitate. A difference in DNL and PPV for the purified VLDL and chylomicron fractions will confirm the successful separation of these particles.

**Methods**

Polyclonal antibodies were produced against the C-terminus of the ApoB100 protein and crosslinked to resin generating ApoB100-specific affinity columns. To yield purified chylomicron and VLDL particles we used this technique in conjunction with stable-isotope tracer methodology in a human feeding study. Two healthy volunteers consumed a standardized diet accompanied by oral dosing of 1-$^{13}$C-acetate every 30 minutes for 8 hours. Plasma collected hourly was used for the isolation of TRL, which was applied to the affinity resin and purified chylomicrons and VLDL collected. Triglycerides were isolated and derivatized. The enrichment of methyl-palmitate was measured by GC/MS and Mass Isotopomer Distribution Analysis was used to calculate DNL and PPV.

**Results**

Western blots confirmed the separation of chylomicrons and VLDL by the described
method. From the purified TRL fractions, the DNL-AUC (%DNL x 5 hours) values for subject 1 were chylomicron 4% and VLDL 34%, an 88% difference, and for subject 2 were chylomicron 8% and VLDL 83%, a 90% difference. The PPV calculated for each fraction in subject 1 were chylomicron 10% and VLDL 13% and in subject 2 were chylomicron 10%, VLDL 12%. On average, the PPV in the chylomicron fraction were 18% less than the VLDL fraction.

Conclusions
In conclusion, results demonstrate that the immunoaffinity method effectively separated postprandial lipoproteins showing fractionated particles carry unique information regarding tissue of origin. Future applications include investigating the respective contribution of fat and sugar to atherosclerosis risk.


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P202

Serum Values of Branched-chain Amino Acids Predict High Triglycerides Among People Free of Diabetes. The Brazilian Longitudinal Study of Adult Health (ELSA-Brasil)

Paulo A Lotufo, Univ of Sao Paulo, Sao Paulo, Brazil; Peter P Toth, Univ of Illinois, Sterling, IL; Michael Blaha, Johns Hopkins Univ, Baltimore, MD; Steven Jones, Johns Hopkins Univ, Baltimore, MD; Isabela M Bensenor, Univ of Sao Paulo, Sao Paulo, Brazil

Introduction: Branched-chain amino acids (isoleucine, leucine, and valine) are associated with new-onset diabetes and incident coronary heart disease and stroke. However, the impact of elevated serum branched-chain amino acids on lipids and lipoproteins remains a matter of investigation. Hypothesis: branched-chain amino acids are independent predictors of dyslipidemia among people free of diabetes.

Methods: We tested this hypothesis among 5060 men and women aged 35 to 74 years-old enrolled in the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil) with a 4-year follow-up. The variable of exposure was serum branched-chain amino acids measured in serum by proton nuclear magnetic resonance (1H NMR) spectroscopy at (LabCorp; Raleigh, NC). The outcome variables were LDL-C greater than 130 mg/dl; HDL-C lower than 40 mg/dl; triglycerides higher than 150 mg/dl during the reappraisal examination. We excluded participants with any type of dyslipidemia at time of baseline, people who sustained a cardiovascular event, and those receiving lipid-lowering therapy or who had a diagnosis of diabetes. The definition of diabetes was self-reported or use of medicines for diabetes or plasma fasting glucose greater than 126 mg/Dl or 2-hour load plasma glucose greater than 200 mg/dl or glycated hemoglobin greater than 6.5 %.

We applied Poisson regression to determine prevalence ratios for dyslipidemia according to a 1-standard deviation of branched-chain amino acids. The final model included age, sex, race, body mass index, waist circumference, a 4-year weight change, insulin resistance (measured by the product of fasting plasma glucose * serum insulin divided by 405), and glycated hemoglobin.

Results: During the 4-year follow-up, 1373 participants met the criteria of study (median age 47 years; 67% women, 59% white), and 736 (53.6%) developed new-onset dyslipidemia: high triglycerides = 1.25 (1.04 to 1.50), low HDL-C = 1.08 (0.98 to 1.20), and high LDL-C = 1.02 (0.91-1.14). The association between 1-SD of
branched-chain amino acids and high triglycerides was present for women [1.27 (1.02 to 1.58), but not for men [1.18 (0.90 to 1.53)]. Analyzing separately for the amino acid, the prevalence ratio for high triglycerides for 1-SD of leucine was 1.34 (1.13 to 1.62); for 1-SD of isoleucine was 1.07 (0.90 to 1.28), and for 1-SD of valine was 1.16 (0.96 to 1.38). Conclusion: Serum values of branched chain amino acids are associated with incident hypertriglyceridemia among people free of diabetes.


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P203 

Lipoprotein Particle Number and Particle Size Profile in Impaired Fasting Glucose or Impaired Glucose Tolerance Are Similar to Those With Diabetes: the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil) 

Isabela M Bensenor, Alessandra C Goulart, Itamar S Santos, Univ of Sao Paulo, Sao Paulo, Brazil; Steven Jones, Johns Hopkins Univ, Baltimore, MD; Raul D Santos, Univ of Sao Paulo, Sao Paulo, Brazil; Michael Blaha, Johns Hopkins Univ, Baltimore, MD; Peter P Toth, Univ of Illinois, Sterling, IL; Paulo A Lotufo, Univ of Sao Paulo, Sao Paulo, Brazil 

Introduction: Although studies have evaluated the association between the lipid profile measured by nuclear magnetic resonance (NMR) and the diagnosis of diabetes, scarce data are available addressing the association of lipoprotein particles and lipoprotein size among people with impaired fasting glucose and impaired glucose tolerance. Hypothesis: People with impaired fasting glucose and impaired glucose tolerance have a more atherogenic lipid profile measured by lipoprotein particle concentration and size compared to subjects without glucose homeostasis alterations and with a similar pattern of to people with diabetes. Methods: We tested this hypothesis among 5060 men and women aged 35 to 74 years-old enrolled in the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil). We measured lipids and lipoproteins subfractions using NMR spectroscopy (LabCorp): 5 triglyceride-rich lipoprotein particles (TRL-P, from very large to very small), 3 LDL-P and 3 HDL-P (large, medium, small) subclasses. Diabetes was defined: fasting plasma glucose ≥126 mg/dl, 2h post-load glucose ≥200 mg/ dl, HbA1c ≥6.5 % or treatment for diabetes; impaired fasting glucose as fasting plasma glucose <126 and >110 mg/dl; impaired glucose tolerance as 2h post-load 75g-glucose between 140-199 mg/dl. Pre-diabetes was defined when one condition impaired fasting glucose or impaired glucose tolerance was identified. We used generalized linear regression models adjusted by sociodemographic/cardiovascular risk factors and lipids measured by enzymatic methods to compare the mean values of each lipoprotein variable. Results: Of the 4,095 subjects (mean age 50± 8.7years-old; 53% women), 706 subjects were diagnosed with diabetes, 365 with impaired fasting glucose, 904 with impaired glucose tolerance, and 2,120 had no glucose homeostasis change (reference group for all comparisons). People with pre-diabetes and diabetes had higher levels of large triglyceride-rich particles (P<0.0001 for all). Subjects with diabetes had lower levels of medium TRL-P; and people with diabetes and impaired glucose tolerance had lower levels of small TRL-P (respectively, P<0.0001, P=0.02). All groups had higher levels of both total LDL-P (P<0.0001 for all) small LDL-P (P<0.0001 for all). HDL particles (total and small) were lower only among subjects with diabetes. Compared with the participants without glucose homeostasis change, the participants with diabetes and pre-diabetes had higher TRL-P sizes (P<0.0001 for all), lower HDL-P sizes (P<0.04 for all), but lower LDL-P sizes were observed for persons with diabetes and impaired glucose tolerance.
Conclusions: Our results suggest that people with impaired fasting glucose or impaired glucose tolerance had a proatherogenic profile of lipoprotein particles compared to people with normal glucose homeostasis and similar to subjects with diabetes.


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P204

Birth Cohort Effects and Lipid Trends—The Impact of the Obesity Epidemic: Evidence From Cohorts Born Between 1930 and 1998 in the United States

Thanh-Huyen T Vu, Donald Lloyd-Jones, Mercedes R Carnethon, John T Wilkins, Northwestern Univ, Chicago, IL; Hy Tran, NORC at the Univ of Chicago, Chicago, IL; Sadiya S Khan, Northwestern Univ, Chicago, IL

Background: Decreasing total cholesterol (TC) and increasing high-density lipoprotein cholesterol (HDL-C) levels have been observed over the past several decades in the US population. It is not clear if the obesity epidemic has mitigated these favorable changes. Hypothesis: Associations between birth cohort and TC and HDL-C levels are partially attenuated by body mass index (BMI).

Methods: We examined differences in TC and HDL-C levels across US birth cohorts born between 1930-1998 from the National Health and Nutrition Examination Surveys (NHANES) exam cycles 1999-2016, and the impact of body mass index (BMI) on these differences. A series of 10-year birth cohorts were constructed (1930-1998). Survey-weighted multivariable-adjusted linear regression models were used.

Results: Among 40,273 participants, 50% were women and 22% non-Hispanic Blacks. After adjustment for age, sex, race, and lipid-lowering medication use, (and age² for the TC model), population mean TC decreased by 5.15 mg/dL and mean HDL-C increased by 1.34 mg/dL for each more recent birth cohort (all P<0.001) (Table). There was an interaction between age and birth cohort for TC, with greater decreases with aging; for example, the mean of TC was 4.14, 6.48, and 8.83 mmHg lower for each more recent birth cohorts at the age of 30, 50, and 70, respectively. BMI was positively associated with TC and negatively associated with HDL-C. However, BMI only slightly influenced the association of birth cohort with TC (2%), but it strongly influenced the birth cohort effect on HDL-C (31%). Conclusion: More recent birth cohorts had lower TC levels and higher HDL-C levels than older birth cohorts in the US. These favorable birth cohort effects were partially compromised by BMI. Research into the environmental and behavioral differences between 20th century US birth cohorts is needed to support future efforts to reduce the prevalence of dyslipidemia.


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P205

Genome-Wide Epigenetic Study of Prenatal Famine Exposure and Blood Lipids in Late Adulthood: The Genomic Research of the Chinese Great Famine (GRECF) Study
Changwei Li, Univ of Georgia, Athens, GA; Zhenghe Wang, Peking Univ Health Science Ctr, Beijing, China; Luqi Shen, Ruiyuan Zhang, Ye Shen, Univ of Georgia, Athens, GA; Jingkai Wei, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Zhiyong Zou, Peking Univ Health Science Ctr, Beijing, China

Objectives: To identify differentially methylated DNA positions associated with prenatal exposure to the Chinese Great Famine and their influence on blood lipids in late adulthood among participants of the Genomic Research of the Chinese Great Famine (GRECF) study.

Methods: The GRECF study was designed to study the influence of the Chinese Great Famine on human genome and metabolic disorders. We randomly selected 8 participants born in a famine stricken area during the Great Chinese Famine (1959-1961) and 8 sex- and residency of location-matched participants born within 3 years after the famine. Genome-wide DNA methylation was profiled using the Illumina EPIC BeadChip. After quality control, a total of 391,633 probes remained for analyses. Total cholesterol, low-density lipoprotein cholesterol (LDLC), and high-density lipoprotein cholesterol (HDLC) were assayed using enzymatic colorimetric tests. Beta values for each probe were compared between individuals with and without famine exposure using the empirical Bayes statistics implemented in Limma software. Probes with a raw p-value <0.05 were mapped to genes using Kobas followed by KEGG pathway enrichment analyses. Those probes were also evaluated for associations with blood lipids using linear regression. False discovery rate (FDR) method was applied to correct for multiple testing. Results: A total of 48,055 CpG positions showed nominal associations (p<0.05) with prenatal famine exposure. None of them was significant after FDR correction. The top seven CpG positions reached p<1x10^{-5} and are relevant to metabolism and/or development. Specifically, prenatal famine exposure was associated increased methylation levels in CpG positions in GBA2, SHOX2, SLC1A4, and NPHP4. Of note, the CpG probe in the GBA2 gene lies in the first exonic region. Pathway enrichment analyses to genes harboring nominally significant probes revealed 44 KEGG pathways that were significant after FDR correction (q<0.05), of which, 17 pathways are related to metabolism, development, and/or energy expenditure, including 11 pathways of the EGFR, FGFR, and SCF/KIT signaling and pathways of gene expression (p=1.2x10^{-11}), metabolism (p=6.8x10^{-11}), developmental biology (p=7.9x10^{-8}), metabolism of protein (p=3.1x10^{-7}), and metabolism of lipids and lipoproteins (p=1.3x10^{-4}). None of the 48,055 probes were associated with blood lipid traits after FDR correction, however, four probes had p-values<1.0x10^{-4} for associations with LDLC or HDLC. The four probes lie in ZC3H18, LINC00243, PIGQ, and HS3ST4 genes, of which, PIGQ plays an important role in lipid metabolism. Conclusion: The small-scale genome-wide epigenetic study revealed important epigenetic changes associated with both prenatal famine exposure and blood lipids in late adulthood.

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P206

Multiple Sclerosis Risk Factors Improved With Residential Lifestyle Intervention

Francisco E Ramirez, Neil Nedley, Nedley Clinic, Colfax, CA; Amy Krueger, Weimar Inst, Weimar, CA

RATIONALE: Previous research suggest that lipids, which are important elements in healthy myelin sheaths, could play a role in multiple sclerosis (MS). This study evaluate the effect on lipids of a medical 18-day lifestyle
program.METHODS: The program is summarized in the word NEWSTART acronym of (N)utrition (vegan diet), (E)xercise, (W)ater, (S)unshine (proper exposure), (T)emperance (proper use of good things and avoiding harmful things), (A)ir (breathing exercises), (R)est, (T)rust in rational, spiritual, and psychological aspects. Patients were seen by certified physicians, nutritionists, and chaplaincy. They received physician consultations, plant-based diet, massage, hydrotherapy and exercise therapy among other modalities. RESULTS: Out of 2081 patients that completed the program in an 11 year period, n=10 had a diagnosis of MS. Only n=9 of the n=10 patients had complete laboratories. Average age of MS patients was 51 (SD 15), 89% were female. At baseline, the average of cholesterol, triglycerides, HDL, and LDL (listed in the same order) was 196, 141, 59, and 100, with an SD of 47.7, 84.3, 10.1, 35.6, minimum of 126, 68, 50, 75, maximum 276, 304, 70, 141 and median 203, 100, 58, 85. On completion of the 18-day program, the average of cholesterol, triglycerides, HDL, and LDL was 174, 129, 49, and 99, SD was 27.4, 64.3, 18.0, 30.1, minimum 139, 64, 28, 69, maximum 214, 270, 87, 147, median 175, 115, 47, 88, t-test values 2.6, 1.2, -2.2, 2.9, significant change? (Yes(p<.02), Yes(p<.2), No(p<.8), Yes(p<0.1).CONCLUSIONS: The program is effective in improving lipids of MS patients. The risk factors cholesterol, triglycerides and LDL responded very well to the intervention. HDL decreased a few point but the change was not significant. Patients seem to benefit from the intervention.

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Frequent but Not Infrequent Potato Consumption is Associated With a Higher Risk of Coronary Artery Disease: the Million Veteran Program

Vijaykumar Bodar, VA Boston Health Care / Brigham and Women's Hosp, Boston, MA; Yuk-Lam Ho, Rachel Ward, Kelly Cho, David Gagnon, VA Boston Health Care, Boston, MA; Michael Gaziano, Luc Djousse', VA Boston Health Care / Brigham and Women's Hosp, Boston, MA

Background
Potato consumption is highly prevalent all around the world. Previous studies have reported a positive association of potato intake with hypertension and diabetes due to high glycemic load. However, data are scarce on potato consumption and risk of coronary artery disease (CAD).

Hypothesis
We hypothesized that potato consumption is positively associated with risk of CAD.

Method
We prospectively studied 148,671 participants from Million Veteran Program(MVP). We used a Willett food frequency questionnaire to assess consumption of baked, boiled, and mashed potatoes. The incidence of CAD was assessed through electronic health record. We used Cox Proportional hazard model to compute the hazard ratio and 95% confidence interval (95% CI) for CAD events across categories of potato intake.

Results
The average age of men was 64 years (SD = 12) and 90 % were men. A total of 6,309 new cases of CAD occurred during mean follow up of 2.7 ± 1.4 y. Median potato consumption was 1 cup/week. The crude incidence of CAD from lowest to highest categories of potato consumption was 14.1, 15.0, 15.2, 16.1, and 18.9 per 1000 person-years, respectively. Hazard ratios (95% CIs) of CAD were 1.00 (reference), 1.01 (0.92-1.11), 1.02 (0.93-1.11), 1.04 (0.95 - 1.15), and 1.21 (1.07-1.36) for potato intake of <1 cup/month, 1-3 cups/month, 1 cup/week, 2-4 cups/week, and 5+ cups/week, respectively.
5+ cups/week respectively, adjusting for age, gender, race, body mass index (BMI), alcohol consumption, exercise, smoking, overall diet quality, and education (P for linear trend = 0.01).

The observed relation of potato consumption with CAD was not modified by age, BMI, gender, and ethnicity. In a sensitivity analysis, exclusion of CAD events occurred during the first year did not alter the findings.

**Conclusion**

Frequent (5+ cups/week) but not infrequent potato consumption was associated with a higher risk of CAD among MVP participants.

**Disclosures:**  

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**P208**

**Demographic and Socioeconomic Determinants of Acute Myocardial Infarction Hospitalization Risks in Florida**

Evah W Odoi, Univ of Tennessee, Maryville, TN; Nicholas Nagle, Russel Zaretzki, Univ of Tennessee, Knoxville, TN; Melissa M. Jordan, Florida Dept of Heath, Tallahassee, FL; Kristina W. Kintziger, Univ of Tennessee, Knoxville, TN

**Introduction:** A better understanding of the dynamics of the spatial relationships between myocardial infarction (MI) hospitalization risks and socioeconomic determinants of health (SDoH) is crucial more optimal targeting of efforts geared towards reducing cardiovascular health disparities and improving population health. The objectives of this study were to identify county-level SDoH of MI hospitalization risks, and to explore whether the associations between MI hospitalizations risks and its predictors varied with geographic location to determine if certain predictors are more important in specific geographic areas in Florida.

**Methodology:** A multivariable global Negative Binomial Regression model (NBR) was used to identify county-level SDoH predictors of inpatient MI hospitalizations occurring in Florida between 2005 and 2014. A local Geographically Weighted Negative Binomial Regression model was then used to explore whether the associations between MI hospitalization risks and SDoH predictors identified in the global NBR model varied depending on geographic location in the state. The spatial distribution of MI hospitalization risks, significant SDoH predictors and non-stationary local regression coefficients were mapped using ArcGIS.

**Results:** The risks of MI hospitalizations were significantly higher in counties with high proportions of residents with less than high school education (P < 0.0001) and divorced residents (P = 0.03). However, they were significantly lower in counties with high proportions of rural residents (P< 0.0001) and African Americans (P = 0.022), and marginally lower in counties with low rates of health insurance coverage (P = 0.056). The strength of associations between MI hospitalization risks and the proportion of population with less than high school education attainment and health uninsurance rate varied based on geographic location in Florida.

**Conclusion:** Race, marital status, educational attainment, rurality and health insurance coverage were significant determinants of MI hospitalization risks in Florida. The strength of associations between MI hospitalization risks and education attainment and health insurance coverage were not constant across the state. These findings indicate that a one-size-fits-all approach is not appropriate for reducing the burden of MI and addressing geographic disparities in utilization of MI care in Florida. Rather, policies and interventions prioritizing identified SDoH factors should be tailored to location-specific community contexts to improve cardiovascular health in Florida.
Trends in Presenting Symptoms Among Acute Myocardial Infarction Patients in Community Surveillance: the Atherosclerosis Risk in Communities Study

Bailey M. DeBarmore, Jessica K. Zègre-Hemsey, Anna M. Kucharska-Newton, Wayne D. Rosamond, Univ of North Carolina CH, Chapel Hill, NC

Introduction: Recent research shows changing incidence rates of AMI by subtype (ST segment elevation [STEMI] and non-ST segment elevation [NSTEMI]), anatomical location, and severity. However, trends in AMI symptom presentation are less well examined. Not all AMI patients present with classic chest pain of cardiac origin. Presentation without cardiac chest pain has been associated with delayed hospital arrival, lower likelihood of receiving medical therapies and cardiac procedures, and higher mortality, as well as female sex, black race/ethnicity, and diabetes.

Objective: We examined trends in symptom presentation in subsets of STEMI and NSTEMI by sex and race in the community surveillance of the ARIC Study from 2005 to 2014.

Methods: Poisson regression was used to estimate sex- and race-specific event rates for AMI with and without classic chest pain of cardiac origin stratified by NSTEMI and STEMI. Events were defined as definite or probable MI with an assigned NSTEMI or STEMI subtype. Event rates were age-standardized to the US 2010 Census population. We examined average annual percent change in event rates over time, and compared comorbidities, in-hospital complications, and 28-day case-fatality of CHD death by symptom presentation, sex, and race, evaluating heterogeneity between sex and race via interaction terms. All analyses were weighted using ARIC sampling fractions.

Results: Between 2005 and 2014, we observed 12,184 AMI events without classic chest pain and 39,512 events with classic chest pain. Events without chest pain were more often NSTEMI vs. STEMI (22% vs. 13%). The decline in event rates over time was similar among NSTEMI patients regardless of presentation symptoms; however, this decline was greater among STEMI patients without classic cardiac pain (-8.03, 95% CI: -10.12, -5.89) than among STEMI patients presenting with classic cardiac pain (-3.02, 95% CI: -4.83, -1.18). The average annual percent decline in event rates differed by race for STEMI but not NSTEMI. Presentation without classic cardiac chest pain was associated with comorbidities such as diabetes, as well as in-hospital complications in both NSTEMI and STEMI patients. Twenty-eight-day case fatality was greater among STEMI patients presenting without classic cardiac chest pain (9.4%, 95% CI: 5.8, 12.9) compared to those with classic cardiac chest pain (4.8%, 95% CI: 3.7, 5.9).

Conclusion: AMI without classic chest pain comprised a larger percent of NSTEMI than STEMI events, and while event rates declined over 2005 to 2014, AMI without classic cardiac chest pain was associated with greater 28-day case fatality and in-hospital complications. Future research should explore care pathways and other reasons why these outcomes may differ by cardiac pain presentation.


Funding: No

Funding Component:

P210
Long-Term Outcomes After ST-Elevation Myocardial Infarction After Reducing Fibrinolytic Use in a Rural Cohort

Catherine P Benziger, Richard Mullvain, Essentia Health, Duluth, MN; Patrick Moran, Rakin Solaiman, Univ of Minnesota, Duluth, MN; Ron Regal, Paul Hitz, Ross Blood, Krysta Kaas, Wilson Ginete, Essentia Health, Duluth, MN

Background: ST-elevation myocardial infarction (STEMI) guidelines recommend lytic therapy if unable to receive primary percutaneous coronary intervention (PPCI) within 120 min. from first medical contact (FMC). Sparse data exists from rural areas; we aimed to evaluate outcomes in rural population after implementing STEMI protocol.

Methods: Retrospective chart review of NCDR ACTION and internal STEMI registries presenting to 2 PCI-capable hospitals (Essentia Health in Duluth, MN and Fargo, ND) between 5/2009-12/2017. Only patients with rural rural-urban commuting area (RUCA) codes were included. Analysis included using standard STEMI metrics with Cox regression and Kaplan-Meier survival curves for survival analysis, and logistic regression for 30-day and 1-year mortality and 30-day readmission. Results were adjusted for age and sex.

Results: There were 1229 STEMI activations with 1033 true STEMI events (28.3% female, mean age 63.6 years). Among true STEMIs, 73.3% presented to a non-PCI capable hospital and were transferred to PCI-capable hospital. Only 9.9% were field activated and transported directly to PCI-capable hospital. FMC to device time was <120 min. 33.2% of the time with a median FMC to device time of 135 min. (IQR 111-174 min.). Positive ECG to device time was <120 min. 53.9% of the time with a median ECG to device time of 116 min. (IQR 99-144 min). Lytic use decreased over time from 30.2% in 2009-10 to 6.8% in 2016-17. Survival was not different comparing PPCI vs. lytic therapy (hazard ratio 1.21; 95% CI: 0.83, 1.75, p=0.32). For PPCI, 30-day and 1-year mortality were 8.6% (Cl:6.8%-10.4%) and 12.8% (Cl:10.6%-15.0%), respectively, while for lytics, 30-day and 1-year mortality were 7.2% (CI:4.6%-9.8%) and 10.8% (CI:7.1%-14.3%), respectively. The 30-day readmission for PPCI was not significantly different compared to lytics (7.6%, Cl:6.7%-8.7% for PPCI vs. 12.0% Cl:9.8%-14.6% for lytic, p=0.056). Conclusion: PPCI in rural areas was associated with similar outcomes compared to lytic therapy for STEMI patients.


Funding: No

Funding Component:

P211

Temporal Trends and Long-Term Outcomes of Elderly Patients With St-Elevation Myocardial Infarction in a Large Rural Healthcare System

Catherine P Benziger, Essentia Health, Duluth, MN; Patrick Moran, Univ of Minnesota, Duluth, MN; Richard Mullvain, Essentia Health, Duluth, MN; Rakin Solaiman, Univ of Minnesota, Duluth, MN; Ron Regal, Paul Hitz, Ross Blood, Krysta Kaas, Wilson Ginete, Essentia Health, Duluth, MN

Background: Limited data about long-term survival in elderly patients after ST-elevation myocardial infarction (STEMI) exists for patients...
in rural settings. We aimed to evaluate temporal trends in lytic use compared to primary percutaneous coronary intervention (PPCI) in elderly patients after the American Heart Association’s Mission: Lifeline program was implemented. **Methods:** Retrospective cohort included patients aged \( \geq 75 \) years with STEMI presenting to 2 PCI-capable hospitals (Essentia Health in Duluth, MN and Fargo, ND) between 5/2009 to 12/2017. Cox regression was used for survival analysis and logistic regression for 30-day and 1-year mortality and 30-day readmission. Results were adjusted for age and gender. **Results:** A total of 358 elderly patients with true STEMI were included (51.1% female, mean age 82.2 years, 61.5% rural). The percentage of elderly patients who received lytics decreased from 20.3% in 2009-2010 to 4.8% in 2016-2017. Median first medical contact (FMC) to device time was 128 min (IQR 84-169) and median positive ECG to device time was 107 min (IQR 78-140). FMC to Device <120 min. was 44.3%; ECG to device <120 min. was 61.6%. There was no difference in survival between lytic and PPCI (HR 1.11, 95%CI:0.67-1.86, \( p=0.68 \)). Mortality was not significantly different between the recent cohort (2016-2017) compared to early cohort (2009-2010) \( (p=0.16, \text{HR 1.43 (0.86-2.30)} \). **Conclusion:** Long-term mortality remains high among elderly patients with STEMI, even among revascularized patients. Prognosis has not significantly changed over the past 8 years despite system changes in treatment strategy.


Funding: No

Funding Component:

**P212**

**Higher Rates of Breastfeeding Mediate the Association Between the 2009 WIC Food Package Change and BMI Z-score at Age 4**

M. Pia Chaparro, Christopher Anderson, Tulane Univ Sch of Public Health and Tropical Med, New Orleans, LA; Catherine M Crespi, May C Wang, UCLA Fielding Sch of Public Health, Los Angeles, CA; Shannon E Whaley, Public Health Fndn Enterprises (PHFE) WIC, Irwindale, CA

**Background** The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) is a federal nutrition assistance program which provides supplemental food and nutrition services to children 0-5 years and their mothers, living in low-income households. In October of 2009, WIC food packages were changed to be better aligned to the Dietary Guidelines of Americans. **Objective** The objective of this study was to evaluate whether observed differences in children’s BMI z-scores (BMIz) at age 4 years between WIC participants enrolled before and after the 2009 policy change could be attributable to changes in the type of infant feeding package they were exposed to. **Methods** Our sample is based on children enrolled in WIC in Los Angeles County, CA between 2003 and 2016, from birth to age 5, with infant package issuance data for 11 or more of the first 13 months of life. Infant package exposure was quantified by the number of months receiving the fully breastfeeding infant package (a proxy for exclusive breastfeeding). A mediation analysis was performed in which BMIz at age 4 was the outcome, WIC package (new vs. old) was the
exposure, and the number of months receiving the fully breastfeeding infant package was the mediator. Mediation was assessed by a product of coefficients method, and confidence limits for the mediated effect were based on the non-normal distribution of the mediated effect, using the PRODCLIN program in SAS. Models were gender-stratified and adjusted for child race/ethnicity, maternal education and language preference, household poverty status, initial weight status, and whether the child had a sibling in the sample. 

**Results**
The sample consisted of 140,204 children. Boys and girls exposed to the new WIC package received the fully breastfeeding infant package for 1.40 and 1.45 months longer than boys and girls exposed to the old WIC package. Among boys, the new WIC package was associated with a 0.12 standard deviation lower BMIz at age 4 (SE 0.01, p<0.0001), whereas the corresponding number for girls was 0.07 (SE 0.01, p<0.0001). Number of months exposed to the fully breastfeeding infant package partially mediated the association between exposure to the new WIC food package (vs. old) and BMIz at age 4, explaining 22.1% of the total effect (95% CI 19.1-25.1) for boys and 34.4% of the total effect (95% CI 29.9-38.9) for girls.

**Conclusions**
Longer exposure to the fully breastfeeding infant package seemed to explain part of the association between BMIz at age 4 and receiving the new (vs. old) WIC food package. The percent of the total effect mediated by months of fully breastfeeding exposure was greater in girls than in boys. Future revisions to the WIC packages that continue to support women to fully breastfeed are likely to have significant effects on childhood obesity.

Disclosures: **M. Chaparro:** None. **C. Anderson:** None. **C.M. Crespi:** None. **M.C. Wang:** None. **S.E. Whaley:** None.

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Funding Component: National Center

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**Serum Metabolomic Profile of Dietary Acid Load in Two Chronic Kidney Disease Studies**

**Casey M Rebholz,** Aditya Surapaneni, Johns Hopkins Univ, Baltimore, MD; Andrew S. Levey, Mark J. Sarnak, Lesley A. Inker, Tufts Medical Ctr, Boston, MA; Lawrence J. Appel, Josef Coresh, Morgan E. Grams, Johns Hopkins Univ, Baltimore, MD

**Background:** Dietary acid load reflects the balance between acid-producing foods (meat, cheese) and base-producing foods (fruits, vegetables), and is clinically important due to its association with risk of cardiovascular disease, diabetes, kidney disease, and mortality.

**Methods:** We used untargeted metabolomics to identify blood biomarkers of dietary acid load in two independent studies of chronic kidney disease patients: the African American Study of Kidney Disease and Hypertension (AASK, n=689) and the Modification of Diet in Renal Disease (MDRD, n=356) study. Multivariable linear regression was used to assess the cross-sectional association between serum metabolites whose identity was known (outcome) and dietary acid load (exposure), estimated with net endogenous acid production based on 24-hour urine levels of urea nitrogen and potassium, and adjusted for age, sex, race, randomization group, mGFR, log-transformed urine protein-to-creatinine ratio, history of cardiovascular disease, body mass index, and smoking status.

**Results:** Out of the 757 known, non-drug metabolites identified in AASK, 26 were significantly associated with net endogenous acid production at the Bonferroni threshold for significance (p<6.6 × 10^{-5}). Twenty-three of the 26 metabolites were also identified in the MDRD study, and 13 of the 23 (57%) were significantly associated with net endogenous acid production (p<2.2 × 10^{-3}), including 5 amino acids, 2 cofactors and vitamins, 1 lipid, and 5 xenobiotics (Table). Higher levels of all 13 replicated metabolites were associated with lower levels of net endogenous acid production in both AASK and the MDRD study.
Conclusion: Untargeted metabolomics of serum specimens from kidney disease patients in two study populations identified 13 replicated metabolites associated with dietary acid load. Additional studies are needed to validate these compounds in healthy populations. These 13 compounds may potentially be used as objective markers of dietary acid load in future nutrition research studies.


Funding: No

Funding Component:

P214

Adherence to Dietary Recommendations of the AHA 2020 Goals and Risk of Preeclampsia Among Danish Women


Objective. Because the role of diet in preeclampsia is unclear, we examined the association between adherence to the American Heart Association’s (AHA) 2020 dietary recommendations and risk of preeclampsia. Methods. We followed 66,161 singleton pregnancies from 62,310 women participating in the Danish National Birth Cohort. Diet was assessed around gestation week 20 with a semi-quantitative food frequency questionnaire (FFQ). Adherence to the AHA dietary recommendations was calculated by a score, which addressed 5 dietary components: fruits and vegetables, fish, whole grains, sodium and sugar-sweetened beverages. Preeclampsia was ascertained by linkage to the Danish National Patient Registry. We estimated relative risks [RR] and 95% confidence intervals [95% CI] of preeclampsia according to increasing quintiles of adherence to the AHA recommendations using logistic regression models with generalized estimating equations to account for repeated pregnancies per woman while adjusting for energy intake, age, BMI, parity, smoking status, socio-economic status, height, region, education, and vitamin C and E intakes. Results. We identified 1,319 (2%) cases of preeclampsia, including 307 (0.5%) cases of severe preeclampsia. The AHA score ranged from 4 to 49 points with a maximum possible score of 50 points. Stronger adherence to the AHA score was inversely associated with the risk of preeclampsia. The adjusted RR [95%CI] among women categorized with the
The highest AHA score compared to women in the lowest score category was 0.81 (95% CI 0.68, 0.96). When each component of the score was separately examined, the association with risk of preeclampsia was largely driven by sodium. Specifically, women with the highest sodium intake (median 3,729 mg/day [range: 3,611, 3,922]) had 20% (95% CI 2, 43%) higher risk of developing preeclampsia compared to women with the lowest sodium intake (median 2,602 mg/day [range 2,435, 2,710]). When sodium intake was excluded from the AHA score, greater adherence to AHA recommendations was no longer related to risk of PE (RR 0.87, 95% CI 0.60, 1.28).

**Conclusions.** Higher adherence to the AHA 2020 dietary recommendations during pregnancy was associated with a lower risk of preeclampsia. Although diet sodium tends to be underestimated when measured by FFQ, we found that sodium intake was related to risk of preeclampsia.


Funding: No

Funding Component:

P215

**Adherence to the Healthy Eating Index-2015 May Reduce the Risk of Incident Cardiovascular Disease, Cardiovascular Disease Mortality, and All-Cause Mortality**

Emily A Hu, Johns Hopkins Univ, Baltimore, MD; Lyn M Steffen, Univ of Minnesota, Minneapolis, MD; Josef Coresh, Lawrence J Appel, Casey M Rebholz, Johns Hopkins Univ, Baltimore, MD

**Background:** The Healthy Eating Index-2015 (HEI-2015) score measures adherence to recommendations from the most recent Dietary Guidelines for Americans. The HEI-2015 was altered from the HEI-2010 by replacing the empty calories component with saturated fat and added sugar. Few studies have examined the association between the HEI-2015 score and incident cardiovascular disease (CVD), CVD mortality, and all-cause mortality.

**Hypothesis:** We hypothesized that a higher HEI-2015 score, indicating better diet quality, would be associated with a lower risk of incident CVD, CVD mortality, and all-cause mortality.

**Methods:** We conducted a prospective analysis of 12,135 participants aged 45-64 years from the Atherosclerosis Risk in Communities (ARIC) study. The HEI-2015 score (0-100) was computed using the average dietary intake assessed using food frequency questionnaires at visits 1 (1987-89) and 3 (1993-95) and divided into quintiles. Incident CVD, CVD mortality, and all-cause mortality were ascertained from baseline through December 31, 2016. We conducted Cox proportional hazards models adjusted for covariates to estimate hazard ratios (HR) and 95% confidence intervals (CI).

**Results:** There were 4,163 cases of incident CVD, 1,429 cases of CVD mortality, and 5,173 cases of all-cause mortality over a median of 25 years of follow-up. Compared to participants in the lowest quintile of HEI-2015 score, participants in the highest quintile had a 12% lower risk of incident CVD (HR: 0.88, 95% CI: 0.79-0.98), 41% lower risk of CVD mortality (HR: 0.59, 95% CI: 0.49-0.71), and 25% lower risk of all-cause mortality (HR: 0.75, 95% CI: 0.69-0.83) after adjusting for covariates (Table). There were significant trends across quintiles of HEI-2015 score for all three outcomes. Results were consistent by subgroups (sex, smoking, diabetes, hypertension).

**Conclusions:** Higher adherence to the Dietary Guidelines for Americans 2015-2020 may reduce the risk of incident CVD, CVD mortality, and all-cause mortality among middle-aged adults in the U.S.

Funding: No

Funding Component: P216

Plant-Based Diets Are Associated With a Lower Risk of Cardiovascular Disease, Cardiovascular Disease Mortality, and All-Cause Mortality

Hyunju Kim, Laura E. Caulfield, Vanessa Garcia-Larsen, Johns Hopkins Sch of Public Health, Baltimore, MD; Lyn M. Steffen, Univ of Minnesota Sch of Public Health, Minneapolis, MN; Josef Coresh, Casey M. Rebholz, Johns Hopkins Sch of Public Health, Baltimore, MD

Introduction: Previous studies of plant-based diets and chronic diseases have limited generalizability because most have been conducted among vegetarians or Adventists who may have healthier lifestyles than the general population.

Hypothesis: We hypothesized that plant-based diets are associated with lower risk of cardiovascular disease and all-cause mortality in a community-based US cohort.

Methods: We used data from middle-aged adults (n=12,168) in the Atherosclerosis Risk in Communities (ARIC) study who were followed from 1987 to 2016. We classified participants’ diet using a plant-based diet index (PDI) and a provegetarian diet index. For the PDI, higher intakes of all plant foods were scored higher. For the provegetarian diet index, higher intakes of selected plant foods were scored higher. Higher intakes of animal foods were scored lower for both indices. We used Cox proportional hazards models to evaluate associations between plant-based diet indices and incident cardiovascular disease, cardiovascular disease mortality, and all-cause mortality, adjusting for several potential confounders.

Results: On average, participants in the highest quintiles of PDI and provegetarian diet index consumed 4.8 servings of fruits and vegetables (FV) and 0.9 servings of red and processed meat per day. Participants in the lowest quintiles consumed 2.8 servings of FV and 1.5 servings of red and processed meat. Higher adherence to PDI was associated with 16% lower risk of cardiovascular disease, 31% lower risk of cardiovascular disease mortality, and 24% lower risk of all-cause mortality (all P-trend<0.001, Table). Similarly, higher adherence to provegetarian diet index was associated with a 15% lower risk of cardiovascular disease, 32% lower risk of cardiovascular disease mortality, and 18% lower risk of all-cause mortality (all P-trend<0.001).

Conclusions: Diets high in plant foods and low in animal foods were associated with lower risk of cardiovascular disease outcomes and all-cause mortality in a general population.
Eating Frequency, Breakfast Consumption, and Abdominal Obesity Among Adults Living in Puerto Rico

Martha Tamez, Josiemer Mattei, Harvard T.H. Chan Sch of Public Health, Boston, MA

Background: Puerto Rican adults have a high burden of obesity, but little information is available regarding eating frequency and breakfast consumption in this at-risk ethnic minority group. Thus, we examined the association between eating frequency, breakfast consumption, and abdominal obesity among adults living in Puerto Rico. Methods: In a cross-sectional study of adults living in Puerto Rico aged 30-75 years old (n=310) were asked to self-report eating frequency, including snacks. Trained interviewers measured waist (WC) and hip circumferences. We calculated the waist-to-hip ratio (WHR) by dividing the waist by the hip measurement. Abdominal obesity was defined as either high WC (men≥94 cm; women≥80 cm) or high WHR (men≥0.90; women≥0.85), using International Diabetes Federation cutoffs. Odds ratios (ORs) and 95% confidence intervals (95% CIs) of having abdominal obesity by frequency of meals (≤1.5; 1.5-3; ≥3 times/d) and for breakfast consumers (vs. non) were estimated using logistic regression models. We adjusted for age, sex, income, smoking status, physical activity, TV watching, energy intake, diet quality, and eating frequency (only for breakfast consumption). Results: The majority of the participants consumed breakfast (70%), ate 1.5-3 times/d (47%), had high WC (75%), and had high WHR (77%). Higher frequency of eating was associated with higher WC after adjustment for confounders. Compared with participants who ate ≤1.5 times/d, those who ate 1.5-3 times/d were more likely to have a higher WC (OR: 2.75, 95% CI: 1.23, 6.15) and those who ate ≥3 times/d were more likely to have an increased WC (OR: 2.88; 95%CI: 1.14, 7.31; P-trend=0.04). Breakfast consumption was not significantly associated with abdominal obesity. Conclusions: Higher frequency of eating, but not breakfast consumption by itself, was significantly associated with abdominal obesity. Our study denotes which eating behaviors may be more relevant for abdominal adiposity among a high-risk ethnic group.

Table 1. Odds ratios (95% confidence intervals) of high waist-to-hip ratio and high waist circumference for eating frequency (complete meals and snacks) and breakfast consumption among adults living in Puerto Rico

<table>
<thead>
<tr>
<th>Eating Frequency</th>
<th>Eating Frequency (men≥94 cm; women≥80 cm)</th>
<th>P-trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤1.5 times/d</td>
<td>Median (min, max)</td>
<td></td>
</tr>
<tr>
<td>(n=88)</td>
<td>1.03 (1.13, 1.36)</td>
<td></td>
</tr>
<tr>
<td>1.5-3 times/d</td>
<td>Median (min, max)</td>
<td></td>
</tr>
<tr>
<td>(n=145)</td>
<td>2.14 (1.07, 3.00)</td>
<td></td>
</tr>
<tr>
<td>≥3 times/d</td>
<td>Median (min, max)</td>
<td></td>
</tr>
<tr>
<td>(n=96)</td>
<td>3.43 (2.42, 4.40)</td>
<td></td>
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</tbody>
</table>

<table>
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<tr>
<th>High waist-to-hip ratio1</th>
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<th>case=13</th>
<th>case=90</th>
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</thead>
<tbody>
<tr>
<td>Crude</td>
<td>1.00 (Ref.)</td>
<td>1.65 (0.86, 3.19)</td>
<td>1.97 (0.96, 4.04)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age-adjusted</td>
<td>1.00 (Ref.)</td>
<td>1.49 (0.77, 2.91)</td>
<td>1.69 (0.81, 3.48)</td>
<td></td>
<td>0.18</td>
</tr>
<tr>
<td>Model 1</td>
<td>1.00 (Ref.)</td>
<td>1.33 (0.63, 2.78)</td>
<td>2.12 (0.88, 5.09)</td>
<td></td>
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<tr>
<td>Model 2</td>
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<table>
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<tr>
<th>High waist circumference2</th>
<th>case=44</th>
<th>case=13</th>
<th>case=95</th>
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<tr>
<td>Crude</td>
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<td>1.92 (1.00, 3.68)</td>
<td>1.56 (0.79, 3.11)</td>
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<tr>
<td>Age-adjusted</td>
<td>1.00 (Ref.)</td>
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<td>1.50 (0.71, 3.18)</td>
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<td>Model 1</td>
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<td>2.58 (1.06, 6.55)</td>
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</table>

1High waist-to-hip ratio was defined as 20.94 cm in men and 23.80 cm in women.
2High waist circumference was defined as 88.94 cm in men and 81.85 cm in women.

Disclosures: M. Tamez: None. J. Mattei: None.

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Funding Component: P219

Central Obesity and All-cause and Cause Specific Mortality: a Systematic Review and Dose-response Meta-analysis of Prospective Studies
Tao Huang, Peking Univ, Beijing, China; Tingting Geng, NUS, Singapore, Singapore

Background: The association of central obesity and mortality risk has not been systematically investigated. The strength and shape of dose-response relationship between central obesity and all-cause and cause specific mortality still remains unclear. Therefore, we conducted a systematic review and meta-analysis to clarify the associations. Methods: Categorical and dose-response meta-analysis was conducted involving of prospective studies. PubMed and Embase were searched up to April 1st, 2017 for eligible studies of waist circumference, waist-to-hip ratio and all-cause and cause specific mortality. Random-effects models were used to derive the summary relative risks (RRs) and corresponding 95% CI for specific categories of central obesity and a continuous association using generalized least-squares trend estimation. Results: A total of 1,760,947 participants in 50 studies were included in the meta-analysis. The pooled RRs for a 10 cm increase in waist circumference were 1.06 (95% CI, 1.04-1.08; I²=92.9%), 1.06 (95% CI, 1.03-1.08; I²=90.9%), 1.21 (95% CI, 1.06-1.35; I²=88.1%) and 1.05 (95% CI, 1.02-1.08; I²=86.5%) for all-cause, cardiovascular disease (CVD), coronary heart disease (CHD), and cancer mortality, respectively. We found a nonlinear relationship between waist circumference and all-cause mortality among both women (p<0.001) and men (p=0.011). The summary RRs for a 0.1 unit in waist-to-hip ratio were 1.17 (95% CI, 1.12-1.21; I²=88.2%), 1.26 (95% CI, 1.17-1.34; I²=66.3%), 1.25 (95% CI, 1.10-1.40; I²=67.8%) and 1.13 (95% CI, 1.09-1.16; I²=0.0%) for all-cause, CVD, CHD, and cancer mortality, respectively. There was evidence of a nonlinear relationship between waist-to-hip ratio and all-cause mortality among women (p=0.016) rather than men (p=0.424). The dose-response relationship between central obesity and cause specific mortality were linear, except the association of waist circumference and CVD mortality (p=0.037), and waist-to-hip ratio and cancer mortality (p=0.039). Conclusions: Higher waist circumference and waist-to-hip ratio measured continuously and categorically, increase the risk of all-cause mortality among men and women and are associated with increased risk of CVD, CHD and cancer mortality.

Disclosures: T. Huang: None. T. Geng: None.

Funding: No

Funding Component:

P220

Whole Blood Selenium Concentration is Inversely Associated With Prevalence of Stroke: Results From the Canadian Health Measures Survey and the US National Health and Nutrition Examine Survey

Xue Feng Hu, Univ of Ottawa, Ottawa, ON, Canada; Saverio Stranges, Western Univ, London, ON, Canada; Hing Man Chan, Univ of Ottawa, Ottawa, ON, Canada

Introduction Each year, over 140,000 Americans and 10,000 Canadians die from stroke. Selenium is an essential trace element involved in antioxidant and anti-inflammatory processes, as well as in intracellular redox regulation and modulation. Observational studies have suggested that Se may have beneficial effects on certain cancer and cardiovascular outcomes. Hypothesis We assessed the hypothesis that blood selenium concentration might be inversely associated with prevalence of stroke and the relationship between blood selenium and prevalence of stroke would be non-linear. Methods Adult respondents (aged 20 and over) from the Canadian Health Measures Survey (CHMS 2007-2011, n = 7065) and the US National Health and Nutrition Examination Survey (NHANES 2011-2012, n = 5030) were analyzed. Age, sex, and other major risk factors for stroke were comparable between the two datasets. Whole blood and urinary selenium were measured in
the CHMS, whole blood and serum selenium were measured in the NHANES. First, we examined the differences in selenium concentrations by stroke status. Second, we used logistic regressions to investigate the difference in prevalence of stroke by whole blood Se tertiles, adjusting for established risk factors. Third, we quantified the potential non-linear association between Se and stroke by restricted cubic spline regression.

**Results**

A total of 82 (1.16%) and 202 (4.02%) stroke cases were identified in CHMS and NHANES, respectively. Respondents with stroke had lower Se levels comparing with those without stroke, with a mean difference of 16 µg/L in CHMS and 12 µg/L in NHANES, respectively. Respondents with high blood selenium concentration (tertile 3) had a lower prevalence of stroke compared to those with low selenium concentration (tertile 1). The adjusted odds ratios were 0.38 (95% CI: 0.15, 0.92) and 0.57 (95% CI: 0.31, 1.03) for CHMS and NHANES, respectively. A continuous decreasing trend of stroke with whole blood selenium was observed in CHMS, whereas the curve plateaued starting at 190 µg/L for NHANES, based on cubic restricted spline regression. Each 10-µg/L increase in whole blood selenium was associated with a 14% decreased prevalence of stroke in CHMS and 19% in NHANES. Sensitivity analysis using serum and urinary selenium demonstrate that our results were consistent across different selenium biomarkers.

**Conclusion**

We observed inverse cross-sectional associations between whole blood Se and prevalence of stroke in representative samples of the Canadian and the US population.

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**Diet Quality and Incidence of Coronary Heart Disease and Coronary Revascularization Among US Women and Men With Hypertension**


**Background:** Hypertension affects 45% of American adults and is a major risk factor for cardiovascular disease. Regrettably, about less than half of all affected individuals have their hypertension controlled. Healthy dietary patterns have been associated with a lower risk of cardiovascular disease in the general population. However, less is known about this association among individuals with hypertension. **Aim:** To study four diet quality scores, the alternate Mediterranean Diet (aMED) score; the alternate Healthy Eating Index 2010 (aHEI-2010); the Dietary Approaches to Stop Hypertension (DASH) score; and a Healthful Plant-based Diet Index (hPDI) and the incidence of coronary heart disease (CHD) and coronary revascularization (bypass, angioplasty or stent) among US women and men with hypertension. **Methods:** We included 22,270 women from the Nurses’ Health Study and 9,846 men from the Health Professionals Follow-up Study that had reported a professionally-diagnosed incident hypertension in 1988 or on subsequent biennial questionnaires. At inclusion, participants were free of other chronic diseases (CHD, coronary artery bypass/angioplasty/stent, angina, other heart disease, stroke, diabetes and cancer). Dietary data were collected every 4 years using a validated semi-quantitative food frequency questionnaire and covariate data were collected biennially. Using the cumulative average of dietary intake after hypertension diagnosis, we
calculated hazard ratios (HR, 95% CI) comparing quintiles 5 to 1 of each diet quality score with multivariable Cox proportional hazards regression while adjusting for age, energy intake, alcohol (DASH and hPDI only), margarine (hPDI only), smoking, BMI, physical activity, family history of CHD, lipid-lowering medication, NSAIDs, postmenopausal hormone use (women) and hypertension medication.

**Results:** We documented 922 incident CHD cases (299,520 person-years) and 1845 incident coronary revascularization cases (298,463 person-years) during follow-up. In pooled multivariable analyses, high adherence to all diet quality scores was inversely associated with risk of CHD (aMED: 0.73, 95% CI 0.59-0.91, p trend: <0.01; aHEI-2010: 0.66, 95% CI 0.53-0.82, p trend: <0.0001; DASH: 0.65, 95% CI 0.52-0.83, p trend: <0.0001; hPDI: 0.78, 95% CI 0.61-0.99, p trend: 0.01) and coronary revascularization (aMED: 0.83, 95% CI 0.71-0.96, p trend: 0.02; aHEI-2010: 0.80, 95% CI 0.69-0.94, p trend: <0.001; DASH: 0.88, 95% CI 0.75-1.03, p trend: 0.10; hPDI: 0.81, 95% CI 0.69-0.96, p trend: 0.07). **Conclusions:** This study suggests that individuals with hypertension may experience a lower risk of CHD and coronary revascularization with high adherence to healthy dietary patterns. Promoting healthy dietary habits among individuals with hypertension could be a cost-efficient and safe way to prevent the incidence of CHD and coronary revascularization.


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**Vitamin D and Airway Inflammation in Adolescent Asthmatics**

**Douglas Mansell, SUNY Downstate, Brooklyn, NY; Robert Freishtat, Children’s Natl Medical Ctr, Northwest, DC**

**BACKGROUND:** Over 25 million people are afflicted with asthma in the U.S. alone, with a higher incidence among adolescents, especially among the African American and Latino population. There has been a focus on the role of low levels of vitamin D (25(OH)D) and asthma severity. The high prevalence of vitamin D insufficiency has been shown to correlate with the high prevalence of asthma in urban youth. Although underlying mechanisms are not clear, vitamin D may regulate inflammation by increased production of anti-inflammatory compounds (IL-10, cAMP, MKP1). Therefore, the objective of this study is to determine which anti-inflammatory mediators are differentially expressed in asthmatic epithelium when exposed to 25(OH)D in conjunction with dexamethasone. The hypothesis is that low levels of vitamin D will be associated with a more pronounced inflammatory milieu and reduced anti-inflammatory response.

**METHODS:** Nasal epithelial cells and demographic data were collected as part of the NIMHD R01 grant funded AsthMaP2 project (pediatric asthma cohort study lead by Robert Freishtat M.D) from urban youth between ages six and 20 years of age with physician-diagnosed asthma for >1 year. Cells were cultured for 90 minutes ex vivo with varying levels of Dexamethasone with or without 25(OH)D (6 conditions). mRNA was profiled using Illumina and validated using NanoString. Network and functional analyses were performed using Ingenuity Pathway Analysis. Confirmatory experiments were performed on human asthmatic and non-asthmatic bronchial epithelial cells exposed to 25(OH)D with or without Dex. Intracellular cAMP was measured with ELISA.

**RESULTS:** Of 214 AsthMaP2 participants, 53% were male and (97%) had persistent asthma. The mean (SE) age=10.9(0.4) years, BMI percentile for age=72.1(3)%, and serum 25(OH)D=19.5(0.9) ng/mL. Whole transcriptome
analyses of nasal epithelial cells (n=7) showed 34 transcripts differentially expressed in all exposure conditions (p≤0.01). Pathways analysis identified cAMP signaling as a top activated pathway impacted by 25(OH)D. Intracellular cAMP levels were 10-fold higher in asthmatic (n=3) vs. non-asthmatic (n=3) tracheal bronchial epithelial cells at baseline (p=0.009). While this difference persisted through 15 minutes of exposure to 25(OH)D with or without DEX, there were no significant changes in intracellular cAMP from baseline in response to exposure conditions.

CONCLUSIONS: The average level of 25(OH)D among both asthmatics and non-asthmatics were deficient. While data show that cAMP is constitutively expressed higher in asthmatics in comparison to non-asthmatics, manipulations of vitamin D level did not alter cAMP levels. Additional experiments using a larger sample size are required to further test the proposed effects of vitamin D, with special focus on cAMP as a transient mediator of inflammation regulation in asthmatic airways.

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Chili Pepper Intake and Risk of Total and Cardiovascular Mortality in Italian Adults: Prospective Findings From the Moli-Sani Study

Marialaura Bonaccio, Augusto Di Castelnuovo, Simona Costanzo, Emilia Ruggiero, Amalia De Curtis, Mariarosaria Persichillo, Chiara Cerletti, Maria Benedetta Donati, Giovanni de Gaetano, Licia Iacoviello, IRCCS NEUROMED, Pozzilli, Italy; Moli-Sani Study Investigators

Introduction: Chili pepper, along with other spices, is an integral part of a traditional Mediterranean diet (MD). Yet there is paucity of epidemiological data on the association between chili pepper intake and mortality risk, with lack of studies from Mediterranean populations. Hypothesis: We assessed the hypothesis of an association between chili pepper consumption and total and cardiovascular (CVD) risk of death in a large sample of the Italian general population, and tested different biological mediators of the association. Methods: Longitudinal analysis on 22,811 men and women aged≥35 years enrolled in the Moli-sani Study cohort, Italy (2005-2010). Chili pepper intake was estimated by the EPIC food frequency questionnaire and categorized as none/rare consumption, up to 2 times/week, 2-4 and > 4 times/week. Multivariable hazard ratios (HR) with 95% confidence intervals (95%CI) were calculated by multivariable Cox regression and competing risk models. Results: Over a median follow up of 8.2 years, a total of 1,236 deaths were ascertained, of which 444 from CVD. Multivariable risk estimates for all-cause and CVD mortality among participants in the regular (>4 times/week) relative to the none/rare intake were, respectively, 0.77 (0.66-0.90) and 0.66 (0.50-0.86). Regular intake also lowered ischemic heart disease (0.55;0.35-0.87) and cerebrovascular death risks (0.39;0.20-0.76). Traditional CVD risk factors (e.g. blood cholesterol, triglycerides) only marginally account for such associations (Table).

Conclusions: In a large Mediterranean population, regular consumption of chili pepper is associated with lower risk of total and CVD death independent of adherence to MD. Known biomarkers only marginally accounted for the association of chili pepper intake with total mortality.

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Hyperhomocysteinemia Mediates the Association of Food Deserts With Recurrent Heart Failure Hospitalizations

Aditi Nayak, Siyi Geng, Emory Univ, Atlanta, GA; Andreas Kalogeropoulos, Stony Brook Univ, Stony Brook, NY; Arshed A Quyyumi, Emory Univ, Atlanta, GA; Javed Butler, Univ of Mississippi Medical Ctr, Jackson, MS; Alanna A Morris, Emory Univ, Atlanta, GA

Background Food deserts (FD) are low-income areas with low access to healthy foods. Prior studies have shown that a diet rich in fruits, vegetables and dairy products substantially lowers homocysteine (Hcy) levels by supplementing folate, vitamin B12, B6 and choline intake. Since Hcy is an independent risk factor for cardiovascular disease, and may be abnormal in subjects living in a FD, we examined the impact of living in a FD on serum Hcy levels and the risk of recurrent heart failure hospitalizations (HFH). Methods FD status was assessed using the USDA FD Research Atlas in 173 HF patients (mean age 57 ± 12 yrs, 63% male, 38% black), prospectively enrolled in the Atlanta Cardiomyopathy Consortium from 2007 to 2011. Hcy values were log-transformed (log2 Hcy) for analysis. Linear regression was used to determine the association of FD with log2 Hcy, and Poisson regression to examine the association of FD with risk of repeat HFH. Models were adjusted for age, gender, race, HF etiology, NYHA class, smoking status, EF, DM, hyperlipidemia, mean arterial pressure, BMI and serum creatinine. Results Patients who lived in a FD (n=29) were younger (p=0.08) and more likely to be black (p<0.001). After adjusting for covariates, FD status was associated with higher log2 Hcy levels (adjusted β estimate: 0.32, 95% CI: 0.11-0.52, p=0.003). During a median follow-up of 827 (IQR 506, 1379) days, 60 (34.7%) subjects had at least 1 HFH. The overall frequency of HFH (40.9 vs. 29.2 per 100 patient-years) was higher in patients who lived in a FD. In a fully adjusted model, for each unit increase in log2 Hcy, there were 1.98 (adjusted, 95% CI: 1.38-2.82, p<0.001) times more HFH. Living in a FD was associated with 1.46 (adjusted, 95% CI: 1.11-1.94, p=0.009) times more HFH. Addition of log2 Hcy to the Poisson model eliminated the association of FD with recurrent HFH (adjusted HR: 1.14, 95% CI: 0.74-1.76, p=0.54). Conclusions Living in a FD is associated with higher serum Hcy. These results provide insights into the mechanisms by which FD status influences the risk of recurrent HFH.

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Changes of Blood Pressure and Urinary Sodium Over 18 Years in Rural China: Results From the INTERMAP China Prospective Study

Li Yan, King’s Coll London, London, United Kingdom; Ellison Carter, Colorado State Univ, Fort Collins, CO; Yu Fu, Tsinghua Univ, Beijing, China; Gaoqiang Xie, Wuxiang Xie, Peking Univ Clinical Res Inst, Beijing, China; Frank Kelly, King’s Coll London, London, United Kingdom; Paul Elliott, Imperial Coll London, London, United Kingdom; Xudong Yang, Tsinghua Univ, Beijing, China; Majid Ezzati, Imperial Coll London, London, United Kingdom; Jill Baumgartner, McGill Univ, Montreal, QC, Canada; Lianchong Zhao, Peking Union Medical Coll & Chinese Acad of Medical Sciences, Beijing, China; Yangfeng Wu, Peking Univ Clinical Res Inst, Beijing, China; Queenie Chan, Imperial Coll London, London, United Kingdom

Background: Tremendous dietary pattern changes could be a driver of the increasing burden of high blood pressure (BP) in developing countries. However, data on nutrition transitions and associated BP changes are scarce.

Objective: To explore BP changes and sodium (Na) consumption over 18 years in China.

Methods: International Collaborative Study of Macro-/Micro-nutrients and Blood Pressure (INTERMAP) enrolled 839 men and women aged 40-59 years from three geographically diverse regions (Beijing, Shanxi in the north and Guangxi in the south) in 1997. INTERMAP China Prospective (ICP) Study followed up these three populations in 2015-2016. Seated BP were measured at least twice following at least 5 minutes of rest, using a random zero sphygmonanometer for the INTERMAP (baseline) and an oscillometric device (Omron HEM-907) for the ICP (follow-up). When calculating BP changes, baseline values were converted using equations developed in a calibration study. Timed 24-hr urine samples were collected at baseline and follow-up using the same protocol. Urinary Na and creatinine (Cr) were measured by emission flame photometry method at baseline and ion-selective electrode method at follow-up. BP and dietary Na changes over time were compared using student t test.

Results: Systolic BP increased considerably in all three sites; largest increment in Guangxi (18.6, 95% CI: 16.0-21.1 mm Hg, P<0.001) and smallest in Beijing (9.1, 6.3-11.8 mm Hg, P<0.001) (Table 1). Level of urinary Na was almost double in north (Beijing and Shanxi) than south (Guangxi) at follow-up (P<0.001), similar as baseline. On average, participants consumed 10.8 (4.7) and 11.8 (4.7) grams of salt at Beijing and Shanxi and 6.3 (3.0) grams of salt at Guangxi at follow-up, though a trend of reduction in Na/Cr (-3.7, 95% CI: -4.7--2.6, P<0.001) overall was documented.

Conclusions: Systolic BP levels increased considerably in this cohort between 1997 and 2015 in rural China. Na consumption might have a declining trend, but still at a very high level at northern China.
Association of Alcohol Intake with Cardiovascular and Total Mortality

Augusto Filippo Di Castelnuovo, Simona Costanzo, Marialaura Bonaccio, IRCCS Neuromed, Pozzilli, Italy; Patrick McElduff, Univ of Newcastle & Hunter Medical Res Inst, Newcastle, Australia; Allan Linneberg, Ctr for Clinical Res and Prevention, Bispebjerg and Frederiksberg Hosp, Copenhagen, Denmark; Veikko Salomaa, Satu Mannisto, Natl Inst for Health and Welfare, Helsinki, Finland; Marie Moitry, Dept of Public Health, Univ Hosp of Strasbourg and Dept of Epidemiology and Public Health, Univ of Strasbourg, Strasbourg, France; Jean Ferrieres, Dept of Epidemiology, Faculty of Med, Toulouse, France; Jean Dallongeville, Univ. Lille, Inserm, CHU Lille, Inst Pasteur de Lille, Lille, France; Barbara Thorand, Helmholtz Zentrum München, German Res Ctr for Environmental Health, Inst of Epidemiology, Neuherberg, Germany; Hermann Brenner, German Cancer Res Ctr, Heidelberg, Germany; Marco Ferrari, Dept di Medicina e Chirurgia, Ctr di Ricerca in Epidemiologia e Medicina Preventiva (EPIMED), Univ dell’Insubria, Varese, Italy; Abdonas Tamosiunas, Lithuanian Univ of Health Sciences, Kaunas, Lithuania; Inger Njolstad, Dept of Community Med, Univ of Tromsø – the Arctic Univ of Norway, Tromsø, Norway; Wojciech Drygas, Dept of Epidemiology CVD Prevention and Health Promotion, Natl Inst of Cardiology, Warsaw, Poland; Yuri Nikitin, The Inst of Internal and Preventive Med, Novosibirsk, Russian Federation; Stefan Soderberg, Dept of Public Health and Clinical Med, and Heart Ctr, Umeå Univ, Umeå, Sweden; Frank Kee, UKCRC Ctr of Excellence for Public Health, Queens Univ of Belfast, Belfast, Ireland; Tanja Zeller, Dept for General and Interventional Cardiology, Univ Heart Ctr Hamburg, Hamburg, Germany; Kari Kuulasmaa, Natl Inst for Health and Welfare, Helsinki, Finland; Stefan Blankenberg, Dept for General and Interventional Cardiology, Univ Heart Ctr Hamburg, Hamburg, Germany; Maria Benedetta Donati, Giovanni de Gaetano, IRCCS Neuromed, Pozzilli, Italy; Licia Iacoviello, IRCCS Neuromed and Dept of Medicine and Chirurgia, Ctr di Ricerca in Epidemiologia e Medicina Preventiva (EPIMED), Univ dell’Insubria, Varese, Pozzilli, Italy

Introduction

Moderate alcohol intake is associated with reduced risk of ischemic heart disease and total mortality but might have a detrimental role in several other diseases (in particular some cancers). The association of moderate alcohol intake with reduced total mortality has therefore been questioned.

Hypothesis

Alcohol intake have a non-linear association with cardiovascular (CV) and total mortality.

Methods

Using harmonised data from the cohorts in the MOnica Risk, Genetics, Archiving and Monograph (MORGAM) Project, the association of alcohol intake with risk of cardiovascular disease and total mortality was assessed using multivariable Cox regression. Multiple imputation (n=10) was used to accommodate

<p>| Table 1 | Descriptive statistics, mean (standard deviation), of blood pressure and urinary sodium and changes of them in long-term follow-up by study sites |
|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|</p>
<table>
<thead>
<tr>
<th>Study Site</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Pressure</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SBP (mmHg)</td>
<td>122.4 (17.8)</td>
<td>124.9 (19.9)</td>
<td>116.3 (14.1)</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>76.5 (8.4)</td>
<td>74.5 (10.0)</td>
<td>66.6 (8.0)</td>
</tr>
<tr>
<td>24-h urinary Na (mmol/24h)</td>
<td>275.0 (92.1)</td>
<td>266.0 (86.4)</td>
<td>137.0 (49.9)</td>
</tr>
<tr>
<td>24-h urinary Na/Cr ratio</td>
<td>50.8 (19.3)</td>
<td>29.2 (6.4)</td>
<td>13.1 (7.9)</td>
</tr>
<tr>
<td>Follow-up (yrs)</td>
<td>16.5</td>
<td>15.2</td>
<td>16.0</td>
</tr>
<tr>
<td>SBP change (mmHg)</td>
<td>53.3 (16.4)</td>
<td>135.0 (17.8)</td>
<td>116.0 (19.2)</td>
</tr>
<tr>
<td>DBP change (mmHg)</td>
<td>75.3 (16.2)</td>
<td>74.6 (10.4)</td>
<td>71.0 (10.6)</td>
</tr>
<tr>
<td>24-h urinary Na/Cr ratio change</td>
<td>24.5 (12.2)</td>
<td>26.4 (11.2)</td>
<td>14.8 (10.0)</td>
</tr>
<tr>
<td>24-h urinary Na/Cr ratio change</td>
<td>-5.3 (12.9)</td>
<td>-2.9 (11.7)</td>
<td>-2.0 (10.4)</td>
</tr>
</tbody>
</table>


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missing data for covariates.

Results
67.4% of the populations studied were drinkers (median intake among drinkers 11 g/day of ethanol, no missing data). Their mortality was observed over median follow-up of 13.8 yrs and covariates (age, sex, smoking, hypertension, diabetes, history of CVD, BMI and level of education) were available for 19 cohorts (1 from Australia and 18 from Europe), including 197,113 individuals (mean age 51±12 y, 60% men, no missing data) and 36,730 deaths (12,644 coronary or cerebrovascular). Former drinkers (2.8%) were excluded from the reference group, which thus comprised habitual teetotallers only (17.7%). Because of missing data, we failed to distinguish between teetotallers and former drinkers in n=24,036 (12.2%) non-drinkers; these individuals were analysed separately but not included in the reference group.

In comparison with the reference group, intake of alcohol up to 5 g/day was associated with a 10.5% (95%CI: 6.7% to 14.2%) reduction in the risk of total mortality and 11.8% (5.2% to 17.9%) in the risk of CV mortality; intake between 5 and 10 g/day with a 6.5% (2.0% to 11.0%) and a 3.4% (0.3% to 15.5%) reduction, respectively, while intake over 20 g/day was associated with a 14.5% (9.6% to 19.7%) increase in risk of total mortality and a 6.3% (-1.5% to 14.7%) rise in the risk of CV mortality. Findings were similar in men and women and according to level of education, whereas they were heterogeneous across Countries, with greater protection by alcohol observed in Italy and France and lowest in Australia. The reduced risk of mortality associated with alcohol in moderation was more marked when the beverage of preference was wine rather than beer or spirits; the increased risk associated with heavy intake appeared in individuals whose beverage of preference was beer or spirits.

Conclusions
Using a large multi Country cohort, we confirmed that intake of more than 2 alcoholic units per day is associated with a detrimental health effect, while intake of alcohol in moderation (up to 1 unit per day) is associated with reduced risk of CV and total mortality, with small variations according to Country and type of alcoholic beverage.


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Relationships of Dietary and Supplement Magnesium Intake and Its Urinary Metabolomic Biomarkers With Blood Pressure: The INTERMAP Study

Queenie Chan, Chung-Ho E Lau, Rachel Gibson, Elena Chekmeneva, Goncalo Dos Santos Correia, Imperial Coll London, London, United Kingdom; Rueyeng Loo, Universities of Kent and Greenwich, Chatham Maritime, United Kingdom; Timothy MD Ebbels, Joram M Posma, Imperial Coll London, London, United Kingdom; Alan R Dyer, Northwestern Univ, Chicago, IL; Katsuyuki Miura, Hirotsugu Ueshima, Shiga Univ of Medical Science, Otsu, Japan; Liancheng Zhao, Peking Union Medical Coll & Chinese Acad of Medical Sciences, Beijing, China; Martha L Daviglus, Univ of Illinois at Chicago, Chicago, IL; Paul Elliott, Imperial Coll London, London, United Kingdom; Jeremiah Stamler, Northwestern Univ, Chigao, IL; Elaine Holmes, Imperial Coll London, London, United Kingdom; Linda Van Horn, Northwestern Univ, Chicago, IL
**Background:** Magnesium (Mg) and other mineral intakes are vital contributors to a healthy diet and appear to have a modest effect on the risk of hypertension. Studies suggest that supplemental Mg can significantly lower blood pressure (BP). Here, we investigate associations of total Mg consumption with the level of its urinary metabolomic biomarkers, and BP.

**Method:** We used cross-sectional data from the International Study of Macronutrients and Blood Pressure (INTERMAP) on 4269 men and women aged 40-59 years from Japan, China, United Kingdom, and United States (US). Regression coefficients with BP per 2 standard deviation (SD) higher dietary Mg from food plus supplement (obtained from 24-hr dietary recalls), urinary Mg (measured by atomic absorption flame photometry) and small molecules (analysed by direct injection mass spectrometry) were estimated using multivariable models, adjusted for age, gender, population sample, intake of total energy and other confounders (see Table). To estimate overall association, country-specific regression coefficients were pooled, weighted by inverse of their variance.

**Results:** Average Mg intakes were 454 (SD=207) mg/day for 770 persons who reported Mg supplementation (89% from US), and 300 (SD=101) mg/day for those who did not. High correlation was found between Mg intake from food plus supplements with urinary Mg ($r=0.38$, $P<0.0001$). Partial correlations of small molecules with total Mg intake ranged from -0.007 to 0.19 for ascorbic acid ($P<0.0001$). Total Mg intake higher by 261.87 mg/day was associated with a systolic BP difference of $-2.65$ mm Hg ($P=6\times10^{-5}$). Urinary Mg excretion higher by 2.66 mmol/day was associated with a diastolic BP difference of $-1.02$ mm Hg ($P=0.02$). There was a non-significant inversely associated between ascorbic acid and BP in some multivariable regression models.

**Conclusion:** Higher intake of Mg, including supplements, was associated with lower BP levels.
**Background** Evidence relating to the benefit of fish consumption on blood pressure (BP) management is inconclusive. Recent research has suggested that different patterns in fish consumption across geographic regions may modify the association between fish intake and cardiovascular outcomes. **Objectives** To investigate the associations between fish intake and BP in Asian and Western population groups and to explore the associations between candidate urinary biomarkers of fish intake and BP. **Methods** The International Study on Macro/Micronutrients and Blood Pressure (INTERMAP) surveyed 4680 men and women aged 40-59 years from four countries: United States of America (US), United Kingdom (UK), Peoples Republic of China (PRC) and Japan between 1996 and 1999. Standardized quality-controlled measures collected included: four 24-hour dietary recalls and two 24-hour urine collections and eight BP measurements. Proton nuclear magnetic resonance spectra of urine specimens were acquired, and partial correlation analysis adjusted for age, sex, and sample/centre were performed to identify candidate peak variables correlating to total fish and shellfish intakes. Multivariable linear regression models conducted on pooled data by geographic region (Asian: Japan and PRC; n=1984, and Western: UK and US; n=2696) estimated differences in BP per 2SD (33.4g/1000kcal) of total fish intake and identified urinary metabolites. **Results** Japan reported the highest daily intake of fish (mean 40.3, SD 22.3 g/1000kcal) with 99% of the cohort classified as consuming fish. Mean daily fish consumption patterns were comparable between the US (9.0 SD 15.0 g/1000kcal; 53% consumers) and UK (8.5 SD, 12.4 g/1000kcal; 55% consumers). No associations were observed between total fish intake and BP in individual cohorts or by geographic region. Trimethylamine N-oxide (TMAO), taurine and homarine were identified as candidate urinary biomarkers of fish intake. Homarine showed a strong correlation with shellfish intake (r =0.43, P<0.0001). Direct associations were observed between TMAO and diastolic BP (DBP) in the Western cohort (β 0.32 95%CI 0.14, 0.50, P = 0.0006; fully adjusted for lifestyle and dietary intakes), this remained significant following adjustment for body mass index (β 0.23, 95%CI 0.05, 0.41, P = 0.012). Taurine and homarine were not associated with BP. **Conclusion** We observed no association between fish consumption and BP across Asian or Western populations. The differential association between urinary TMAO and DBP in Western and Asian population groups requires further investigation.

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**Adherence to the MIND Diet is Associated with a Favorable Profile of Subclinical Cardiac Remodeling in the Framingham Offspring Cohort**

**Maura E Walker,** Adrienne O'Donnell, Jayandra Himali, Boston Univ, Boston, MA; Debora Melo van Lent, Univ of Texas, San Antonio, TX; Vanessa Xanthakis, Boston Univ, Boston, MA; Sudha Seshadri, Univ of Texas, San Antonio, TX; Vasan Ramachandran, Boston Univ, Boston, MA

**Introduction:** The Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) diet is based on the central components of the Mediterranean and DASH diets and emphasizes foods that may provide a neurocognitive benefit. To date, no study has investigated adherence to the MIND diet and indices of cardiac remodeling. We hypothesized that adherence to the MIND diet may have a
favorable impact on indices of cardiac remodeling. Methods: Multivariable linear regression related the MIND diet score to echocardiographic indices of cardiac remodeling in 2569 Framingham Offspring cohort participants (mean age, 67 years; 55% women). The MIND diet score contains 15 components, each with a maximum score of 1 (max score =15). We averaged MIND diet scores across 2-4 exam cycles. Primary and secondary echocardiographic measures are in Table 1. Simple models (model 1) were adjusted for age, sex, and total energy intake, and additional models (model 2) were further adjusted for BMI, smoking, total/high-density lipoprotein cholesterol (TC-HDL) ratio, heart rate, diabetes, systolic blood pressure, and use of anti-hypertensive medication. Results: Participants had a mean (±SD) cumulative MIND diet score of 6.9 (± 1.7). The cumulative MIND diet score was significantly associated with favorable measures of $E/e'$, GLS, GCS, and MAPSE in model 1 (Table 1). Associations between the MIND diet score and echocardiographic measures were attenuated and became non-significant in model 2 (Table 1). A higher MIND diet score was associated with lower levels of several clinical risk factors including BMI (β±SE (p value): -0.01±0.002 (<.0001)), TC-HDL ratio (-0.05±0.01 (0.0002)), heart rate (-0.83±0.12 (<.0001)), with lower odds of diabetes (OR [95% CI]: 0.88 [0.82, 0.94]), and use of anti-hypertensive medication (0.94 [0.90, 0.99]). Conclusions: Favorable associations between cumulative adherence to the MIND diet and echocardiographic indices are likely mediated by the favorable impact of adherence to the MIND diet on clinical risk factors.

Table 1: Cumulative MIND diet score and echocardiographic measures in exam 8 of the Framingham Offspring Cohort

<table>
<thead>
<tr>
<th>Echocardiographic measures</th>
<th>Model 1 (N=2183)</th>
<th>Model 2 (N=2457)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Ventricular Ejection Fraction (LVEF)</td>
<td>0.12 (0.09)</td>
<td>0.13 (0.09)</td>
</tr>
<tr>
<td>Left Atrial Ejecting Fraction (LAEF)*</td>
<td>0.01 (0.005)</td>
<td>0.004 (0.005)</td>
</tr>
<tr>
<td>Left Ventricular Mass Indexed by Body Surface Area (LVMI)*</td>
<td>0.01 (0.002)</td>
<td>0.004 (0.002)</td>
</tr>
<tr>
<td>$E/e'$</td>
<td>-0.01 (0.003)</td>
<td>-0.01 (0.003)</td>
</tr>
<tr>
<td>Global longitudinal strain (GLS)</td>
<td>-0.11 (0.04)</td>
<td>-0.08 (0.04)</td>
</tr>
<tr>
<td>Global circumferential strain (GCS)</td>
<td>-0.24 (0.08)</td>
<td>-0.12 (0.07)</td>
</tr>
<tr>
<td>Mitral annular plane systolic excursion (MAPSE)</td>
<td>0.01 (0.003)</td>
<td>0.01 (0.003)</td>
</tr>
<tr>
<td>Longitudinal synchrony (LS)</td>
<td>-0.01 (0.01)</td>
<td>-0.003 (0.01)</td>
</tr>
<tr>
<td>Aortic root (AR)</td>
<td>0.005 (0.004)</td>
<td>0.003 (0.004)</td>
</tr>
</tbody>
</table>

*Natural log transformed to normalize the distribution
Model 1 adjusted for age, sex, total caloric intake.
Model 2 additionally adjusted for systolic blood pressure, anti-hypertensive medication, diabetes mellitus, TC, HDL, ratio, BMI, and heart rate


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P231

Sugar-Sweetened Beverage Consumption is Associated with Higher Circulating Ceramide Concentrations in the Framingham Offspring Cohort

Maura E Walker, Vanessa Xanthakis, Lynn L Moore, Vasan Ramachandran, Boston Univ, Boston, MA; Paul F Jacques, Tufts Univ, Boston, MA

Introduction: Ceramides are a class of sphingolipid that have been implicated in the pathogenesis of cardiometabolic diseases, and their circulating concentrations may be affected by foods that can alter hepatic lipid metabolism. We hypothesized that sugar-sweetened beverage (SSB) consumption may influence plasma concentrations of three ceramide species. Methods: Framingham Offspring cohort participants (N=2142; mean age, 65 years; 57% women) were categorized based on SSB consumption, as non-consumers (0 to < 1 serving/month), occasional consumers
(1 serving/month to <1 serving/week), frequent consumers (1 serving/week to <1 serving/day), and daily consumers (≥1 serving/day). Plasma ceramide concentrations were assayed using a validated LC-MS/MS protocol. Multivariable linear regression models related frequency of SSB consumption to plasma ceramide concentrations (C16:0, C22:0, and C24:0), and to ceramide ratios (C22:0/C16:0 and C24:0/C16:0). Models adjusted for age, sex, smoking status, use of lipid-lowering medication, total energy, alcohol, diet quality, physical activity, and BMI. We explored if the SSB effects were modified by use of lipid-lowering medication, BMI (< 25 vs ≥ 25), or diabetes status (pre-diabetic/diabetic vs non-diabetic). Analyses were repeated using mean cumulative SSB consumption reflective of usual intake over 14 years. Results: Approximately 49% of participants were non-consumers, 20% occasional consumers, 25% frequent consumers, and 6% daily consumers, of SSBs. On average daily SSB consumers were younger, more likely to be men, more likely to smoke, had a lower diet quality, and were slightly more physically active (P trend <0.05). Concentrations (LS mean [95% CI] µg/mL) of the C16:0 ceramide were 0.163 [0.161, 0.166] for non-consumers and 0.169 [0.163, 0.175] for daily consumers (P trend <0.05). Concentrations of the C22:0 ceramide were 0.601 [0.599, 0.620] for non-consumers and 0.634 [0.604, 0.664] for daily consumers (P trend <0.05). There were no statistically significant associations between SSB consumption and plasma concentrations of the C24:0 ceramide or with ceramide ratios (C22:0/C16:0 and C24:0/C16:0). None of the interactions evaluated were statistically significant. Results of analyses using mean cumulative SSB consumption were similar but additionally indicated a significant positive association with concentrations of the C24:0 ceramide; concentrations were 2.252 [2.193, 2.312] for non-consumers and 2.428 [2.313, 2.542] for daily consumers (P trend <0.05).

Conclusion: In our cross-sectional community-based sample of middle-aged adults, SSB consumption was positively associated with plasma concentrations of several ceramide species but not with ceramide ratios. This study may help to elucidate mechanisms mediating the association between SSB consumption and higher risk of cardiometabolic diseases.

Disclosures: M.E. Walker: None. V. Xanthakis: None. L.L. Moore: None. V. Ramachandran: None. P.F. Jacques: None.

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P232

Better Dietary Quality is Associated with Lower Circulating Ceramide Concentrations in the Framingham Offspring Cohort

Maura E Walker, Vanessa Xanthakis, Lynn L Moore, Vasan Ramachandran, Boston Univ, Boston, MA; Paul F Jacques, Tufts Univ, Boston, MA

Introduction: Diet quality may alter cardiometabolic risk by the modification of circulating lipid species. Ceramides are a class of sphingolipid implicated in cardiometabolic risk. We hypothesized that a higher diet quality may be associated with lower plasma concentrations of three ceramide species. Methods: Diet quality was reflective of adherence to the 2010 Dietary Guidelines for Americans and was determined using the 2010 dietary guideline adherence index (DGAI-2010) score. The DGAI-2010 score is composed of 14 energy specific components and 11 healthy choice components. A higher score represents higher adherence with a maximum score of 100. We determined the average cumulative DGAI-2010, reflective of usual diet quality over 14 years. Plasma ceramide concentrations were assayed using a validated LC-MS/MS protocol. Participants of Framingham Offspring cohort (N = 2174; mean age, 66 years; 55% women) according to quartile of DGAI-2010 score. Multivariable linear regression was used to
relate diet quality to plasma ceramide concentrations (C16:0, C22:0, and C24:0), and to ceramide ratios (C22:0/C16:0 and C24:0/C16:0). An initial model was adjusted for age, sex, smoking status, use of lipid-lowering medication, total energy intake, and physical activity, and then additionally for body mass index (BMI). **Results:** The median (IQR) DGAI-2010 score within each quartile was Q1: 49 (7), Q2: 58 (4), Q3: 65 (3), and Q4: 73 (6). On average participants in the highest quartile (Q4) of DGAI-2010 score were older, more likely to be a woman, less likely to smoke, were slightly more physically active, and had a lower BMI (P trend <0.05). The DGAI-2010 score was inversely associated with concentrations of the C16:0, C22:0, and C24:0 ceramides and the C22:0/C16:0 ratio (all P trend <0.05) but not the C24:0/C16:0 ratio (Table 1). **Conclusion:** Inverse relations of dietary quality and select circulating ceramide species may help elucidate how diet may influence cardiometabolic risk.

**Table 1.** Associations of the DGAI-2010 score with plasma ceramide concentrations (C16:0, C22:0, and C24:0) and ceramide ratios.

<table>
<thead>
<tr>
<th>Quartile</th>
<th>C16:0</th>
<th>C22:0</th>
<th>C24:0</th>
<th>C22:0/C16:0</th>
<th>C24:0/C16:0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>0.670</td>
<td>0.640</td>
<td>0.630</td>
<td>0.670</td>
<td>0.650</td>
</tr>
<tr>
<td>Q2</td>
<td>0.670</td>
<td>0.650</td>
<td>0.640</td>
<td>0.650</td>
<td>0.640</td>
</tr>
<tr>
<td>Q3</td>
<td>0.670</td>
<td>0.640</td>
<td>0.630</td>
<td>0.660</td>
<td>0.650</td>
</tr>
<tr>
<td>Q4</td>
<td>0.670</td>
<td>0.650</td>
<td>0.640</td>
<td>0.660</td>
<td>0.650</td>
</tr>
</tbody>
</table>

**Haley W Parker,** Univ of Rhode Island, Kingston, RI; Anne N Thorndike, Massachusetts General Hosp, Harvard Medical Sch, Kingston, RI; Maya Vadiveloo, Univ of Rhode Island, Kingston, RI

**Introduction:** The Grocery Purchase Quality Index (GPQI) is a new, objective diet quality index that assesses adherence of household grocery purchases to the US Dietary Guidelines. Currently, little is known about the correlation between the GPQI and other common diet quality metrics like the Healthy Eating Index (HEI), and whether shopper characteristics (e.g., demographics, shopping habits) influence the strength of this correlation and the utility of the GPQI as a tool for tracking diet quality.

**Hypothesis:** The GPQI and HEI-2010 will be moderately correlated at baseline in a cohort of shoppers enrolled in a study testing strategies to promote healthier grocery purchases, and these correlations will vary by shopper characteristics. **Methods:** Data from 224 households recruited from a single medium-sized grocery store were analyzed. Eligible participants were ≥18y, the primary shopper of their household, and did ≥50% of household shopping at store. Participants completed a baseline (Aug-Oct 2018) validated online food frequency questionnaire (FFQ) and a questionnaire about demographics and shopping habits. HEI-2010 scores were calculated from FFQs and GPQI scores were calculated from 2-6 weeks of baseline purchasing data; higher scores reflected healthier diets. Correlations between HEI and GPQI scores (reported as percent of total score) were calculated in SAS 9.4 for the overall sample and by demographic characteristics and shopping habits of interest. **Results:** The sample was predominantly female (90%), older (mean age=55.6±13.7), and higher socioeconomic status (47.9% >college degree, 49.7% household income >$100k). The mean HEI score was 73.0±9.3% out of 100pts, the mean GPQI score was 54.5±11.4% out of 75pts, and the mean BMI was 25.4±4.6. The two scores were moderately correlated in the overall sample (r=0.31, p<0.001); correlations were stronger in

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**Funding Component:**

**P233**

**Correlations Between Grocery Purchase Quality Index Scores and Healthy Eating Index Scores Vary by Demographics and Shopping Habits**
men \( (r=0.52, \ p=0.02) \), middle-income \( ($60-100k) \) households \( (r=0.51, \ p=0.001) \), and individuals with underweight \( (n=14, \ r=0.58, \ p=0.03) \), and obesity \( (r=0.39, \ p=0.04) \) and weaker in individuals with normal weight \( (r=0.28, \ p=0.003) \). The GQPI and HEI were not correlated for individuals with overweight \( (r=0.16) \) low-income \( (<$60k) \) households \( (r=0.16) \) or for those who shopped at farmer’s markets within the past month \( (r=0.15) \) whereas individuals who shopped at other grocery or superstores \( (r=0.31-0.35) \) had correlations similar to the overall sample.

**Conclusion:** These findings suggest that food purchasing data reflects the individual diet quality and may be a promising tool for evaluating and monitoring individual-level diet quality. Further research should explore influential demographics and shopping habits on the strength of the correlation between the GQPI and HEI to develop more accurate predictive models using objective household purchasing data as a proxy for individual-level intake.

**Disclosures:** H.W. Parker: None. A.N. Thorndike: None. M. Vadiveloo: None.

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P234

**Social Coherence and Religious/Spiritual Coping Skills Modify Associations Between Weight-Related Discrimination and Risk of Multi-System Physiological Dysregulation Among US Adults**

Maya Vadiveloo, Univ Rhode Island, Kingston, RI; Josieter Mattei, Harvard T.H. Chan Sch of Public Health, Boston, MA

**Background:** Weight discrimination is associated with higher multi-system physiological dysregulation, referred to as allostatic load (AL), which increases cardiovascular risk. While reducing weight discrimination is critical for reducing its negative consequences, it is unclear whether individual-level factors can attenuate associations between weight discrimination and AL. This study examined whether religious and spiritual coping practices as well as beliefs about societal complexity modified the effect of weight discrimination on AL among adults aged 25-75y over 10-years.

**Hypothesis:** Individual-level factors may attenuate associations between weight discrimination and AL.

**Methods:** Participants from the national Midlife Development in the US (MIDUS) Biomarker Substudy with self-reported information on weight discrimination, individual-level factors, and perceptions about social coherence were analyzed \( (n=953) \). Social coherence (i.e. degree to which the world makes sense) and religious/spiritual coping (i.e. seeking religious/spiritual support for comfort and guidance) were assessed via 4 self-reported Likert items at baseline, with higher scores indicative of higher coherence and coping. Self-reported perceived discrimination across 9 scenarios at baseline and 10-years follow-up were summed and averaged to compute long-term discrimination. The proportion of 24 dysregulated biomarkers within 7 systems was summed to compute AL \( (0-7) \). Interactions between social coherence and religious/spiritual coping were tested using a threshold of \( p<0.05 \). Median splits for social coherence, religious/spiritual coping, and weight discrimination were computed and AL \( \geq 3 \) was deemed high. Estimated relative risks (RR) were obtained from multivariable models adjusted for age, household income, sex and baseline BMI.

**Results:** Obesity was present in 41% of the sample, 8% reported weight discrimination, and 19% had high AL. Both social coherence \( (p=0.048) \) and religious/spiritual coping \( (p=0.03) \) modified associations between weight discrimination and AL. In stratified analyses, participants with high social coherence experienced triple the risk of high AL (RR:3.11;
95% CI: 1.82, 5.30) while weight discrimination was not associated with AL among individuals with low social coherence (RR: 1.35, 95% CI: 0.71, 2.61). Conversely, high religious/spiritual coping attenuated associations between weight discrimination and AL (RR: 0.98, 95% CI: 0.27, 3.55), while low religious/spiritual coping was associated with AL (RR: 2.46, 95% CI: 1.61, 3.77).

Conclusions: Some individual-level factors may modify associations between weight discrimination and high AL. Mindfulness and tools that adjust internalization of societal messages about weight status have the potential to produce beneficial metabolic effects that could improve cardiovascular outcomes.

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P235

A Healthy Plant-Based Diet Index is Favorably Associated With Cardiometabolic Risk Factors in the Mediators of Atherosclerosis in South Asians Living in America (MASALA) Study

Shilpa N Bhupathiraju, Harvard Medical Sch, Boston, MA; Zhilei Shan, Frank B Hu, Harvard Sch of Public Health, Boston, MA; Namratha R Kandula, Northwestern Feinberg Sch of Med, Chicago, IL; Alka M Kanaya, Univ of California San Francisco, San Francisco, CA

Introduction: Plant-based diets are recommended for the prevention of type 2 diabetes (T2D) and cardiovascular disease (CVD). South Asians primarily consume a plant-based diet but also have a disproportionately high risk of cardiometabolic disease. Because not all plant foods are beneficial to health, we previously developed a healthy plant-based diet index (hPDI) to reflect consumption of high-quality plant foods. To create the hPDI, we assigned healthy plant foods (whole grains, fruits, vegetables, herbs/spices, nuts, legumes, tea/coffee) positive scores, while less healthy plant foods (juices, sugar sweetened beverages, refined grains, deep fried snacks/pickles, potatoes, coconut, and sweets) and animal foods received reverse scores. We examined cross-sectional and prospective associations between the hPDI and cardiometabolic risk markers (dyslipidemia, glycemia, inflammation, body composition, subclinical atherosclerosis, and incident T2D) among South Asians in the US. We hypothesized that those with higher scores on the hPDI will have a better cardiometabolic risk profile.

Methods: We included 891 South Asians (mean age=55 y, 53% male) who completed the baseline visit in MASALA with reliable food frequency questionnaire data. The prospective analysis included 735 South Asians who completed exam 2 (~5 y after baseline). We used multivariable general linear or logistic regression to examine cross-sectional and prospective associations between hPDI and cardiometabolic risk adjusting for age, sex, education, income, medication use, calories, BMI, and various lifestyle, dietary, and cultural factors. In prospective analyses, we adjusted for the baseline value of the corresponding outcome variable.

Results: At baseline, the hPDI was inversely associated with HOMA-IR and HbA1C [% decrease ± SE for every 5 unit higher hPDI: HOMA-IR=-2.76 ± 1.39, HbA1c = -0.37 ± 0.14]. There were no associations with beta-cell function, fasting and 2-h glucose, triglycerides, HDL-C, C-reactive protein, adiponectin, or subclinical atherosclerosis. A higher score on the hPDI (β ± SE for 5 unit increase) was associated with lower LDL-C (-1.50 ± 0.66 mg/dL), BMI (-0.20 ± 0.09 kg/m²), weight (-0.54 ± 0.25 kg), visceral fat (-1.92 ± 0.94 cm²), a lower likelihood of fatty liver (OR=0.78, 95% CI: 0.65-0.93), and obesity (OR=0.91, 95% CI: 0.82-1.00). Prospectively, we found no associations between hPDI and measures of glycemia (glucose, HbA1C) and dyslipidemia.
(triglycerides, HDL-C, and LDL-C). The hPDI was inversely, but non-significantly, associated with a lower risk of incident T2D [RR (95% CI) per 5 unit hPDI = 0.87 (0.71-1.08), n=45 cases].

**Conclusions:** A higher intake of healthful plant-based foods was associated with a favorable cardiometabolic risk profile. Continued follow-up of the MASALA cohort will determine if the hPDI is associated with lower incident T2D and CVD events.


Funding: No

**Funding Component:**

P237

**Relation of Egg Intake to Blood Pressure: The International Study on Macro/Micronutrients and Blood Pressure (INTERMAP)**

Thanh-Huyen T Vu, Linda Van Horn, Northwestern Univ, Chicago, IL; Queenie Chan, Imperial Coll London, London, United Kingdom; Martha L Daviglus, Univ of Illinois at Chicago, Chicago, IL; Jeremiah Stamler, Northwestern Univ, Chicago, IL

**Background:** Data regarding associations of egg intake, a major source of dietary cholesterol, with blood pressure (BP) are limited, especially from large, diverse population samples, and findings have been inconsistent. **Methods:** Associations between egg intake and BP were examined using data on 4680 men and women, aged 40-59 years, between 1996 and 1999, from the INTERMAP study that included 17 population samples in the United States (US), United Kingdom (UK), China and Japan. Data were collected from four 24-hour dietary recalls, 2 timed 24-hour urine collections and 8 BP measurements. Egg intake was calculated as amount consumed per day using the Nutrient Data Software for Research (University of Minnesota, USA). Multivariable linear regression models were used to estimate differences in BP per 2-SD of egg intake (50.71g/day). Country-specific regression coefficients were pooled, weighted by inverse of their variance to estimate overall association.

**Results:** Of 4680 participants, 50% were women. Daily egg intake was highest among individuals from Japan (mean 37.74, SD 24.3g/day). With adjustment for age, sex, population sample, and average dietary energy intake/day, egg intake was significantly associated with SBP in both the pooled sample and the US sample. With each 2-SD higher egg intake, US mean SBP was significantly higher by 2mmHg (Model 1-Table). The associations remained significant with further adjustment for education level, family history of hypertension, smoking status, and use of dietary supplement (Model 2-Table). With further adjustment for urinary sodium and urinary potassium or BMI, the associations were no longer significant. No association was found for other countries, and for DBP. **Conclusion:** An adverse association between egg intake and SBP was observed in the US but not in other countries. Notably, this association was strongly attenuated by urinary sodium, urinary potassium and BMI. Further research is needed to better understand the relation of egg intake and BP.

### Table: Multivariable Adjusted Association of Egg Intake with Systolic Blood Pressure

<table>
<thead>
<tr>
<th>Country</th>
<th>Japan</th>
<th>China</th>
<th>UK</th>
<th>US</th>
<th>Pooled Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean egg intake (SD)</td>
<td>37.74 (23.51)</td>
<td>36.90 (23.98)</td>
<td>35.07 (23.73)</td>
<td>36.02 (23.94)</td>
<td></td>
</tr>
<tr>
<td>Model 1 [β SE]</td>
<td>1.23 (0.06)</td>
<td>1.05 (0.06)</td>
<td>1.31 (0.06)</td>
<td>1.28 (0.06)</td>
<td></td>
</tr>
<tr>
<td>Model 2 [β SE]</td>
<td>1.13 (0.06)</td>
<td>1.15 (0.06)</td>
<td>0.74 (0.09)</td>
<td>1.45 (0.06)</td>
<td></td>
</tr>
</tbody>
</table>

Table: Multivariable Adjusted Association of Egg Intake with Systolic Blood Pressure

1. Model 1 adjusted for age, sex, population sample, and average dietary energy intake/day.
2. Model 2 adjusted for variables in Model 1 plus education level, family history of hypertension, smoking status, and use of dietary supplement.
3. αp<0.05. **βp<0.01.***
4. Country-specific regression coefficients were pooled, weighted by inverse of their variance.


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P238
Sociodemographic Factors Associated With Under- and Overweight Among Women of Reproductive Age in Sub-Saharan Africa

Jason Were, Irena Creed, Saverio Stranges, Western Univ, London, ON, Canada

Introduction In the last three decades, many countries in SSA have undergone rapid epidemiological and nutritional transitions, with an ever-increasing prevalence of cardiometabolic conditions. Because of these changes, health care systems in the sub-region are faced with the simultaneous challenge of handling both underweight and overweight related sequelae. There is still limited epidemiological evidence on the drivers of this phenomenon within and across countries in SSA.

Hypotheses We assessed the following hypotheses: 1) SSA countries vary in terms of the type and extent of malnutrition; 2) Macro (country level) and micro (individual level) sociodemographic factors are associated with the double burden of malnutrition (i.e. under- and overweight) in SSA.

Methods Macro- and micro-level data for 34 SSA countries were acquired from the World Bank data base and Demographic and Health (DHS) surveys respectively. A total of 247,691 eligible participants (women between the age of 15 and 49) from the DHS surveys were analyzed. We first determined malnutrition categories in SSA from country level prevalence estimates of underweight and overweight using statistically defined logic expressions. Second, we used random forest analysis to investigate the association between the malnutrition groups and macro-level variables. Third, we used random forest analysis and multivariable multinomial logistic regression models to investigate the association between micro level variables and the three BMI categories i.e. underweight (BMI <18.5), normal weight (BMI 18.5 to 24.9) and overweight (BMI≥25).

Results Out of the 34 countries studied, the prevalence of underweight was greater than 10% in 3 countries, whereas 13 countries had both underweight and overweight prevalence exceeding 10%. Overweight (BMI 25 to 29.9) prevalence exceeded 10% in 7 countries, while the obese (BMI≥30) prevalence was at least 10% in 11 countries. Macro level random forest analysis showed that fertility rate and gross domestic product (GDP) were key correlates of the malnutrition groups found in SSA. However, age, wealth and parity were key correlates of women's nutritional status at the micro level. Old age and wealth were consistently associated with overweight across all the countries. However, parity was a risk factor for underweight in underweight countries, and a risk factor for overweight in overweight countries.

Conclusion In conclusion, we observed consistent cross-sectional associations between measures of fertility, wealth and age and the dual forms of malnutrition (under- and overweight) among women in SSA.

Disclosures: J. Were: None. I. Creed: None. S. Stranges: None.

Funding: No

Funding Component:

P239

Sugar-Sweetened Beverage Consumption and Risk of Type 2 Diabetes in African Americans: Findings From the Jackson Heart Study

Chandra L Jackson, Natl Inst of Environmental Health Sciences, Research Triangle Park, NC; Arnita F Norwood, Mario Sims, The Univ of Mississippi Medical Ctr, Jackson, MS; W. Braxton Jackson II, Social & Scientific Systems, Inc., Research Triangle Park, NC; Adolfo Correa, The Univ of Mississippi Medical Ctr, Jackson, MS; Vasanti Malik, Harvard Sch of Public Health, Boston, MA; Katherine L Tucker, Univ of Massachusetts Lowell, Lowell, MA
BACKGROUND: There is a paucity of data investigating whether consumption of sugar-sweetened beverages (SSBs) is associated with an increased risk of type 2 diabetes (T2D) among African Americans. OBJECTIVE: To determine, in a prospective analysis, whether SSB consumption is associated with increased risk of T2D among African Americans.

RESEARCH DESIGN AND METHODS: Using a community-based prospective investigation of Jackson Heart Study adult participants from 2004 to 2010, we estimated risk of T2D by frequency of SSB consumption adjusting for age, sex, marital status, CVD, total energy intake, physical activity, smoking status, alcohol consumption, socioeconomic status, and body mass index (BMI) as a potential mediator.

RESULTS: Among 3,223 study participants, the mean age was 53±12.5 years, 63% were women, and 66% had at least a college education. Total energy intake, and intakes of carbohydrates, fat, sugar and caffeine increased with increasing SSB consumption, and 21% of participants consumed ≥1 SSB per day. Mean follow-up was 7.5 years with 24,124 person-years, and there were 561 cases of incident diabetes. After age and sex adjustment, SSB consumption was not significantly associated with T2D risk: hazard ratio (HR): 1.61 [95% confidence interval (CI): 0.58-4.48] for 1-4 times/month, HR: 1.77 [95%CI: 0.66-4.76] for 2-6 times/week, and HR: 1.81 [95%CI: 0.67-4.85] for ≥1/day (p for trend=0.291) compared to <1/month. In fully-adjusted models, associations remained positive but non-significant and adjustment for BMI attenuated the associations minimally (≤3%).

CONCLUSIONS: Although HRs tended to increase with higher intake, the frequency of SSB intake was not significantly associated with risk of T2D in African Americans. Larger studies in this population with consideration of other aspects of the diet are warranted.


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P240

Sugar-Sweetened Beverage Intake and Cardiovascular Disease Risk in the California Teachers Study

Lorena S Pacheco, Univ of California, San Diego, La Jolla, CA; James V Lacey Jr., City of Hope, Duarte, CA; Maria E Martinez, Univ of California, San Diego, La Jolla, CA; Hector Lemus, San Diego State Univ, San Diego, CA; Cheryl AM Anderson, Univ of California, San Diego, La Jolla, CA

Introduction: Previous observational studies have shown a positive association between sugar-sweetened beverage (SSB) consumption and cardiovascular disease (CVD) risk, but many have been relatively short-term.

Objective: To determine the association of SSB consumption over a 20-year period and incident CVD in a large prospective cohort of middle-aged women.

Methods: Data are from the California Teachers Study, a US based longitudinal cohort comprised of 133,477 female teachers and administrators who were active or recently retired members of the California State Teachers Retirement System in 1995. After excluding those with a history of CVD and type 2 diabetes mellitus at baseline, our analytic sample was 107,905. SSB consumption constituted regular soft drinks, sweetened bottled waters and teas, and fruit drinks (other than fruit juice) and was derived from a self-administered Block95 food frequency questionnaire. SSB consumption was divided into four categories: Rare or never, >rare/never to <1 serving per week, ≥1 serving per week to <1 serving per day, and ≥1 serving per day. CVD endpoints were based on annual linkage with statewide hospitalization records, defined as first occurrence of myocardial infarction, coronary artery bypass grafting (CABG) or stroke following the International Statistical
Classification of Diseases 9<sup>th</sup> and 10<sup>th</sup> Revision coding system. Cox proportional hazards models were used to assess the association between SSB consumption and incident CVD, after adjusting for potential confounders and mediators.

**Results:** Of a total of 8,946 CVD incident cases over 20 years, the majority were strokes (5,728). In an age-adjusted model, we observed increased hazard ratios (HR) for CVD (HR 1.24 [95% CI 1.11, 1.38]), CABG (HR 1.39 [95% CI 1.13, 1.71]), and stroke (HR 1.21 [95% CI 1.05, 1.39]) events in women who consumed ≥1 serving/day vs those who rarely/never consumed SSBs. Our fully adjusted model included age, smoking, alcohol intake, physical activity, multivitamin and aspirin use, menopausal status, hormone replacement therapy, oral contraceptive use, history of hypertension, body mass index, fruit and vegetable intake, and total energy intake. This model slightly attenuated the hazard for CVD (HR 1.20 [95% CI 1.07, 1.35]), CABG (HR 1.25 [95% CI 1.00, 1.06]), and stroke (HR 1.18 [1.01, 1.37]) in women who consumed ≥1 serving/day in comparison to women that rarely/never consumed SSBs.

**Conclusions:** If this finding is replicated, SSB consumption might be a modifiable dietary target to reduce risk of CVD among women.


Funding: No

Funding Component:

**P241**

**Snoring is Associated With Obesity Among Middle Aged Slum-Dwelling Women in Mysore India**

**Karl F Krupp,** Florida Intl Univ, Miami, FL; Arun Srinivas, Apollo Hosp, Mysore, India; Khurram Nasir, Yale Univ Medical Sch, New Haven, CT; Vijaya Srinivas, Public Health Inst of India, Mysore, India; Elena Bastida, FloridaIntl Univ, Miami, FL

**Background:** Globally, rates of obesity have trebled in the past four decades. India has more than 9.8 million men and 20 million women classified as obese. While poor diet and sedentary lifestyles are major causes, growing evidence suggests other factors like sleep-disordered-breathing may also be contributors.

**Methods:** A cross-sectional survey was carried out between October 2017 and May 2018 among a nonprobability sample of slum-dwelling women, 40 to 64 years of age, in government-designated slums in Mysore, India. In addition to socio-demographics, data were collected on tobacco and alcohol consumption, diet, physical activity, sleep, quality of life, and personal and family history of diagnosed cardiometabolic disorders. Body mass Index (BMI) was calculated using anthropometry. Serum was tested for HbA1c and lipids. Electrocardiography was carried out by a trained medical technician.

**Results:** In this sample of slum dwelling women, snoring was associated with obesity. Habitual snorers had more than double the odds (Adjusted Odds Ratio [aOR] 2.05; 95% Confidence Interval [CI]1.26-3.33; p<0.004) of obesity I, and seven times the odds (aOR 7.71; CI: 3.58-16.62; p<0.001) of having obesity II compared to non-snorers after adjustment for age, diabetes, hypertension, hypercholesterolemia, and daytime sleepiness. There was no difference in obesity status among participants reporting abnormal sleep duration, napping, daytime sleepiness, sleep apnea, insomnia, or use of sleep medication.

**Conclusion:** The relationship of snoring and obesity has not been well explored. This study among slum-dwelling Indian women, found a significant relationship between snoring and obesity. Future research should explore the underlying mechanisms connecting snoring to BMI.
Association of Obesity With Arterial Stiffness: The Multi-Ethnic Study of Atherosclerosis (MESA)

Jeongok Logan, Hyojung Kang, Soyoun Kim, Univ of Virginia, Charlottesville, VA; Daniel Duprez, Univ of Minnesota, Minneapolis, MN; Younghoon Kwon, Univ of Virginia, Charlottesville, VA; David Jacobs, Univ of Minnesota, Minneapolis, MN; Nketi Forbang, Univ of California San Diego, San Diego, CA; Jennifer M Lobo, Min-Woong Sohn, Univ of Virginia, Charlottesville, VA

**Background:** Arterial stiffness is recognized as an important subclinical marker of cardiovascular disease (CVD). However, the relationship between obesity and arterial stiffness is unclear.

**Methods:** Applanation tonometry was used to estimate arterial stiffness, defined as high augmentation index (Alx) and low C1 and C2 in participants enrolled in the Multi-Ethnic Study of Atherosclerosis (MESA) at baseline. Analysis of covariance was used to compare Alx, C1, and C2 across categories of body mass index (BMI) (<25, 25-29.9, 30-39.9, > 40 kg/m²) and waist-hip ratio (WHR) (<0.85, 0.85-0.99, ≥1). Age-obesity interaction was tested among obesity groups across age categories (45 - 54, 55 - 64, 65 - 74, and 75 - 84 years old).

**Results:** Among 6,177 participants (mean age 62±10 years, 52% female), there was significant inverse relationship between obesity and arterial stiffness. After adjustments for CVD risk factors, participants with BMI > 40 kg/m² had 5.4% lower Alx (mean difference [Δ] = -0.83; 95% CI, -1.12 - -0.54), 13.5% higher C1 (Δ = 1.40; 95% CI, 0.73 - 2.07), and 41.2% higher C2 (Δ = 1.53; 95% CI, 1.19 - 1.88) compared to participants with BMI < 25 kg/m² (all p for trend <0.001). Participants with WHR ≥ 1 had 1.7% lower Alx (Δ = -0.26; 95% CI, -0.46 - -0.06), 6.1% higher C1 (Δ = 0.98; 95% CI, 0.53 - 1.43), and 6.1% higher C2 (Δ = 0.28; 95% CI, 0.05 - 0.51) compared to those with WHR <0.85 (all p for trend < 0.05). WHR had a significant interaction with age on Alx and C2, and the inverse relationship between WHR and arterial stiffness was only observed in participants aged < 55 years.

**Conclusions:** Obesity as measured by BMI and WHR was associated with lower arterial stiffness presented as lower Alx and higher C1 and C2. There was a significant age interaction with WHR on Alx and C2, but not with BMI. Differential effects of WHR versus BMI on arterial stiffness in older adults should be further investigated in future studies.
Objective: Heart fat depots, within [epicardial adipose tissue (EAT)] and outside [paracardial adipose tissue (PAT)] the pericardium, have been linked to carotid atherosclerosis in various populations. Postmenopausal women have greater volumes of heart fat than premenopausal women. Our previous work suggests that lower endogenous estrogen may contribute to heart fat accumulation, although possibly limited to PAT, while postmenopausal oral hormone therapy (HT) may slow its progression. We evaluated the effect modification of HT use over 48 months on associations between heart fat accumulation and carotid artery intima-media thickness (CIMT) progression in recently postmenopausal women.

Methods: The Kronos Early Estrogen Prevention Study (KEEPS) was a multi-center, randomized, double-blind placebo-controlled trial to investigate effects over 48 months of oral conjugated equine estrogens (o-CEE) and transdermal 17β-estradiol (t-E2), both given with cyclic progesterone, compared to placebo, on progression of CIMT in recently postmenopausal women. EAT and PAT volumes, and CIMT were measured at baseline and at 48 months. Associations between the absolute changes in heart fat volumes and CIMT as well as effect modification by HT type were tested using linear regression, adjusting for age, race, study site, employment status, diastolic and systolic blood pressure, anti-hypertensive medications, insulin resistance index, lipids, body-mass index, smoking, alcohol consumption, C-reactive protein, and adipokines.

Results: Of 727 randomly assigned women, 467 [mean age (SD): 52.7(2.5); 78.2% Caucasian] had heart fat volumes and CIMT measured at both time points. Overall, changes in EAT and PAT were not associated with CIMT progression; however, assigned treatment significantly modified the association between changes in PAT, but not EAT, and CIMT progression in unadjusted model, P=0.04. In o-CEE group, CIMT progression was 0.028mm (SE:0.01mm) lower, per 1 unit increase in log PAT, than in t-E2 group, P=0.01, and trended 0.017mm (SE:0.01mm) lower than in placebo group, P=0.09. Although adjusted analysis attenuated these findings (P-value for interaction 0.09), differences between o-CEE and t-E2 groups remained significant, P=0.03.

Conclusion: HT use modified the association between PAT accumulation, but not EAT, and CIMT progression. Our results suggest a potential beneficial impact of o-CEE (but not transdermal E2) on the relationship between adverse changes in PAT and CIMT. The current findings support the notion that EAT and PAT are distinct fat depots and suggest a complex role of HT in the association between heart fat and CIMT progression in recently postmenopausal women.


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P244

Serum Uric Acid Level is A Predictor of Nonalcoholic Fatty Liver Disease in an Apparently Healthy Population
Cristina P Baena, Grasiele L Martins, Mariana F Leite, Ariele B Haagsma, Clara I de Paiva, Guilherme R Kallaur, Andre M Nogueira, Camila C Simao, Camila Cavalli, Daniele R Goss, Paulo A Junior, PUCPR, Curitiba, Brazil

Background: Nonalcoholic Fatty Liver Disease (NAFLD) is the most frequent hepatic abnormality in the western countries and commonly asymptomatic. Known risk factors for the disease are obesity, type 2 diabetes, hypertension and dyslipidemia. Serum Uric Acid levels (SUA) has been associated with a variety of cardiometabolic disorders. Yet the relationship between NAFLD and SUA is less known. Hypothesis: We assessed the hypothesis that there is an association between SUA levels with NAFLD in an apparently healthy population in Brazil. Materials and Methods: A cross-sectional study was conducted among 2,660 adult Brazilians who underwent a medical check-up at Marcelino Champagnat Hospital in Curitiba/PR. Sociodemographic, anthropometric and laboratory evaluations were conducted, including abdominal ultrasonography. NAFLD was diagnosed by abdominal ultrasound, with evidence of contrast between the liver and renal parenchyma. Individuals with history of significant alcohol consumption (intake superior to 140g/week for men and 70g/week for women) or using hipouricemic medications were excluded from the analysis. Binary logistic regression models were built to test the impact of SUA levels on NAFLD by sex. Adjustments were subsequently made by age, fasting glucose, body mass index, hypertension, dyslipidemia and smoking status to test the independence of SUA in association with NAFLD. Results: We included 1,329 men (46.1±8.5 years) and 351 women (46.3±8.2 years) in the final analysis. Prevalence of NAFLD were 35.6% and 38.7% for men and women, respectively (p<0.001). Mean SUA levels were significantly higher in subjects with NAFLD (6.52±1.30mg/dL vs 5.51±1.41 mg/dL) in men and (6.36±1.34 mg/dL vs 5.53±1.28 mg/dL) in women (p<0.001 for both). Crude models for NAFLD by unit of SUA yielded OR of 1.69 (CI 95% 1.53-1.86) and 1.61 (CI 95% 1.33-1.94) for men and women, respectively. Fully adjusted models showed OR of 1.43 (CI 95% 1.27-1.62) and 1.48 (CI 95% 1.17-1.88), for men and women, respectively. Conclusion: SUA levels are independently associated with NAFLD in an apparently healthy population. Future studies should explore the benefits of lowering SUA levels on NAFLD prevention and potential mechanisms of this association.


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P245

Economic Residential Segregation is Associated With Obesity and Visceral Adiposity in Brazilian Women: the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil)

Sharrelle Barber, Drexel Univ, Philadelphia, PA; Letícia Cardoso, Fundação Oswaldo Cruz, Rio de Janeiro, Brazil; Julianne Nelson, Drexel Univ, Philadelphia, PA; Rosane Griep, Maria M. Fonseca, Fundação Oswaldo Cruz, Rio de Janeiro, Brazil; Sandhi Barreto, Luana Giatti, Lidvane V. Camelo, Federal Univ of Minas Gerais, Belo Horizonte, Brazil; Ana V. Diez Roux, Drexel Univ, Philadelphia, PA; Dora Chor, Fundação Oswaldo Cruz, Rio de Janeiro, Brazil

Introduction: Obesity and obesity-related diseases are increasing globally with the sharpest increases occurring in low and middle-income countries. Economic residential segregation results in increased exposure to adverse neighborhood environments; however, the impact of segregation on markers of obesity have been mostly investigated in US-based
samples. Using a novel spatial measure of neighborhood-level economic residential segregation (hereafter, segregation) we examined the association between segregation, obesity and visceral adiposity in the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil).

**Methods:** The sample included 6,104 women and 4,789 men ages 35-74 with complete geocoded information from the baseline examination of ELSA-Brasil (2008-2010). Segregation was based on data from the 2010 IBGE demographic census and calculated for study-defined neighborhoods using the local Gi* statistic—a spatially weighted z-score that represents how much a neighborhood’s income composition deviates from the larger metropolitan area. Body mass index (BMI) was calculated by dividing the participants’ measured weight in kilograms by their measured height in meters squared. Participants were considered “obese” if they had a BMI greater than 30 kg/m². Visceral adiposity was assessed using measured waist circumference (in cm) as a proxy. Based on statistically significant interactions between gender and segregation, gender-stratified multivariable logistic and linear regression models were used to test associations between segregation and obesity status and visceral adiposity, respectively.

**Results:** Approximately 14% of the sample resided in segregated neighborhoods. Blacks and Browns were more likely to reside in segregated neighborhoods than Whites (Blacks: 25.9%; Browns: 20.2%; Whites: 8.2%). The prevalence of obesity in the sample was 24% among women and 20% among men and was highest among Black women living in the most economically segregated neighborhood environments (35%). After adjusting for age, sex, race, education, income, and study site, segregation was positively associated with obesity among women (OR: 1.29, 95% CI: 1.07-1.56). Associations for men were not statistically significant (OR: 1.07; 95% CI: 0.85-1.34). Similar patterns were found for visceral adiposity among women (High Segregation, $\beta=1.94 \pm 0.51$, $p=0.0002$; Medium Segregation, $\beta=0.90 \pm 0.39$, $p=0.0192$) with no statistically significant findings among men.

**Conclusion:** Women residing in economically segregated neighborhoods in Brazil appear to be at an increased risk of obesity and have higher levels of visceral adiposity. Black women may be at highest risk in these settings. Policies and/or structural interventions designed to improve neighborhood conditions may be viable strategies to mitigate the burden of obesity in this setting.


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**P246**

**Fish Oil Supplementation During Early Life Improves Metabolic Health in Diet Induced Obesity**

**Latha Ramalingam,** Kalhara Menikdewella, Shane Scoggin, Naima Moustaid-Moussa, Texas Tech Univ, Lubbock, TX

Objective: Obesity is a global epidemic and a complex disease that increases the risk for cardiovascular and metabolic disorders. Over half of American women of child bearing age are either obese or overweight, putting their offspring at high risk for childhood obesity and comorbidity. Hence, maternal programming through diet is critical for prevention of obesity and its metabolic complications in the offspring. Fish oil (FO), rich in very long chain omega 3 polyunsaturated fatty acids exert various health benefits such as reduced serum triglycerides, inflammation and insulin resistance. However, it remains unclear whether maternal and/or postnatal consumption of FO protects offspring
Combination of Obesity and Metabolic Syndrome is Associated With Highest Rate of Depression Secondary to Increased Inflammation


Introduction: A growing body of evidence suggests that obesity and metabolic syndrome (MetS) are associated with depression and that inflammation may play a role. However, the separate and combined associations of obesity and MetS on the prevalence of depression and their relationship with inflammation have not been investigated.

Hypothesis: We hypothesized that the combination of obesity and MetS would be associated with the highest rates of both depression and elevated inflammation.

Methods: Data were collected from the National Health and Nutrition Examination Survey between 2009 and 2014. Depression was assessed with the Patient Health Questionnaire-9 (PHQ-9) and was defined with a cut-point of ≥ 10. Obesity was defined as BMI ≥ 30 kg/m². MetS was defined based on the American Heart Association consensus definition. Participants were divided into four groups: healthy normal weight, metabolically healthy obesity, metabolically unhealthy normal weight, and metabolic unhealthy obese (MUO). C-reactive protein was assessed in a subsample.

Results: Participants with MUO had the highest prevalence of depression compared to the healthy group (14.8% vs 6.8, P<0.001). The mean PHQ-9 score was also highest among the MUO group (4.16 ± 0.09). While both obesity and MetS were independently associated with depression, there was a significant interaction between the two (P<0.001, Figure). On adjusted analysis, the MUO group had the highest odds of depression (Figure). The MUO group also showed the highest geometric mean levels of C-reactive protein compared to the healthy group (0.34 ± 0.03 vs 0.11 ± 0.03, P<0.001). Levels of C-reactive protein mediated the effect between
MUO and depressive symptoms (80.5% of the total effect).

**Conclusion:** Both obesity and MetS are associated with depression independent of each other, but participants with both conditions have the highest odds of depression. These findings underscore the importance of cardiometabolic disturbances as correlates of mental health status.

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**P248**

**Increased Arterial Stiffness Measures in Morbidly Obese Patients After Bariatric Surgery**

Frances Wang, Chao Yang, Johns Hopkins Univ Bloomberg Sch of Public Health, Baltimore, MD; Hirofumi Tanaka, Univ of Texas at Austin, Austin, TX; Josef Coresh, Chiadi Ndumele, Kunihiro Matsushita, Johns Hopkins Univ Bloomberg Sch of Public Health, Baltimore, MD

**Introduction:** The association between obesity and arterial stiffness is complex and has been reported to be modified by age, with a positive association in older adults and an inverse association in younger adults. Additionally, several diet and exercise-based programs have demonstrated conflicting results regarding changes in arterial stiffness before and after weight reduction. However, few have explored arterial stiffness outcomes in bariatric surgery patients.

**Objective:** To characterize changes in arterial stiffness after bariatric surgery.

**Methods:** In 72 morbidly obese patients, we evaluated two measures of arterial stiffness, cardio-ankle vascular index (CAVI) and heart-ankle pulse wave velocity (haPWV), ~1 month prior to and 6 and 12 months after bariatric surgery. Arterial stiffness measures were assessed twice at each visit and averages were reported. Paired t-tests were used to evaluate the significance of changes after bariatric surgery.

**Results:** The mean age of our study sample was 44.5 years (SD 11.2), and 72.2% were female. Average BMI substantially decreased after bariatric surgery (from 47.1 to 34.8 kg/m$^2$). Similarly, systolic blood pressure declined after surgery (from a mean of 143.0 to 131.7 mmHg) whereas diastolic blood pressure did not significantly differ. Both arterial stiffness measures, CAVI and haPWV, were significantly elevated after bariatric surgery (Figure, p<0.001). CAVI increased from baseline by an average of 0.64 (95% confidence interval [CI]: 0.42-0.87) at 6-month follow-up and 0.80 (95% CI: 0.53-1.07) 1 year after surgery. A similar pattern was observed for haPWV.

**Conclusions:** Despite favorable changes in body weight and blood pressure, arterial stiffness measures were elevated after bariatric surgery. Although this observation is in line with an inverse association between obesity and arterial stiffness in younger adults, future studies are necessary to explore the underlying mechanisms and clinical implications of increased arterial stiffness after bariatric surgery.
Central Obesity and Systemic Inflammation Predict Subsequent Levels of Procollagen Type III N-Terminal Peptide in Framingham Offspring Study Adults

Richard T Pickering, Martha R Singer, Vanessa Xanthakis, Vasan S Ramachandran, Lynn L Moore, Boston Univ Sch of Med, Boston, MA

Background: Fibrosis is a process that, in healthy individuals, is characterized by deposition of extracellular matrix (ECM) components. However, in pathological states, such as the low-grade inflammation associated with obesity, excessive tissue ECM production is associated with dysfunction of various organs such as liver, kidney, and adipose tissue. Procollagen Type III N-terminal peptide (P3NP) is produced during collagen synthesis and is linked to adverse outcomes including cardiovascular events. Few studies have examined the relationship between systemic inflammation or body fat distribution and P3NP.

Methods: Data from the prospective Framingham Offspring study were used to examine the link between systemic inflammation, body fat distribution and P3NP. Of the 944 individuals with P3NP measured at exam 6, 737 had CRP measured at exam 2 and 859 had waist circumference measured at exam 4, along with potential confounders including sex, age, smoking, and body mass index (BMI). Levels of serum CRP at exam 2 were classified into 3 groups (≤1.0, 1.0 to ≤3.0, >3.0 mg/L) and waist circumference was divided in sex specific quintiles. Due to non-normality, levels of P3NP were log transformed. Multivariable general linear models were used to assess the associations between both CRP and waist circumference and P3NP. Age, sex, smoking status, physical activity and BMI were assessed as potential confounders.

Results: Compared with individuals with the lowest levels of CRP at exam 2 (≤1mg/L) those with intermediate or high levels (CRP: 1.0 to ≤3.0, and >3.0) had statistically significantly higher levels of plasma P3NP at exam 6 (3.8 ± 0.2, 4.2 ± 0.3, and 4.3 ± 0.3 mg/L, from lowest to highest category, respectively, p-trend<0.001). Additionally, men in the two highest quintiles of waist circumference at exam 4 had statistically significantly (p<0.05) higher plasma P3NP levels than those in the lowest quintile (4.6 ± 0.4, 4.5 ± 0.4 vs. 3.7 ± 0.4 mg/L for quintiles 5 and 4 vs. 1, respectively). No effect was seen in women. Conclusions: These results suggest a link between both systemic inflammation and waist size (a simple indicator of central adiposity) and circulating markers of fibrosis. These findings may suggest that adverse health outcomes associated with visceral adiposity and systemic inflammation may be linked with development of fibrosis.


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Sex-Related Differences in the Associations of Variability in Body Mass Index and Metabolic Health With Incidence of Obesity and Metabolically Unhealthy Status: The Framingham Offspring Study

Todd R. Sponholtz, Ramachandran S. Vasan, Boston Univ Sch of Med, Boston, MA

Introduction: Higher variability of body mass index (BMI) is associated with both cardiometabolic and cardiovascular disease in high-risk individuals. It is unclear, however if variability of BMI impacts metabolic health or obesity risk in healthy adults and if any potential associations vary for women vs. men.

Methods: We classified Framingham Offspring cohort participants (n=3,961, mean age 50.8 years, 53.8% women) according to their obesity (BMI ≥ 30 kg/m²) and metabolic health status (<2 non-obesity NCEP ATPIII conditions) and followed them prospectively 1987 to 2014. BMI and metabolic syndrome (MetS)-associated measures in the top quintile of the variance independent of the mean were classified as being variable. ‘Variable metabolic health’ (VMH) was defined as ≥2 ‘variable’ non-obesity MetS components. We estimated sex-specific incident rate ratios (IRRs) and 95% confidence intervals (95% CIs) for the associations of time-varying obesity, metabolic health status, and variability of BMI and metabolic health with the incidence of obesity and metabolically unhealthy state using Cox proportional hazards regression for interval-censored outcomes with age as the time scale.

Results: On follow-up, 567 participants (313 women) developed new-onset obesity over 9,434 person-periods, and 759 individuals (437 women) developed a metabolically unhealthy state over 5,754 person-periods. After adjustment for covariates, being metabolically unhealthy was associated with a greater risk of new-onset obesity among women (153%, 95% CI: 1, 79%; psex-difference=0.005) compared with men (-11%, 95% CI: -49, 53% (psex-difference=0.007). Among participants without obesity, BMI variability was associated with a greater risk of incident obesity in women (275%, 95% CI: 185, 393%) compared with men (33%, 95% CI: -22, 129% psex-difference=0.005). Obesity was positively associated with greater risk of incident unhealthy metabolic state in women (157%, 95% CI: 93, 342%) compared to men (16%, 95% CI: -17, 62%; psex-difference=0.006). Metabolic health did not alter the risk of either outcome among metabolically healthy or unhealthy individuals.

Conclusions: Our longitudinal observations in a community-based sample suggest sex-related differences in the associations of variability of BMI and metabolic health on obesity and cardiometabolic risk. Additional investigations are warranted to replicate our findings and elucidate the biological basis for these sex-related differences.

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P251

Association Between Different Measures of Obesity and Kidney Function Decline

Zhi Yu, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Morgan E Grams, Chiadi E Ndumele, Johns Hopkins Sch of Med, Baltimore, MD; Lynne Wagenknecht, Wake Forest Sch of Med, Winston-Salem, NC; Eric Boerwinkle, UTHealth Sch of Public Health, Houston, TX; Kari North, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Casey M Rebholz, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Edward L Giovannucci, Harvard T.H. Chan Sch of Public Health, Boston, MA; Josef Coresh, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD
Introduction
Obesity has been related to increased risk of incident cardiovascular disease, diabetes, and mortality as well as chronic kidney disease (CKD). However, the effect of obesity on long-term kidney function and whether it differs by gender and race are not known. **Hypothesis** Obesity status is associated with future decline in kidney function.

**Methods** Obesity was measured by baseline body mass index (BMI), waist to hip ratio (WHR), and predicted percent fat (PPF) among 14,020 White (W) and African-American (AA) men and women (M/F) in the Atherosclerosis Risk in Communities (ARIC) study who were diabetes-free, had BMI > 18.5 kg/m², and had estimated glomerular filtration rate (eGFR) > 60 ml/min/1.73 m² at baseline. Obesity was categorized into tertiles within each race-sex group. PPF was derived using anthropometric prediction equations including information on age, race, weight, height, and waist circumference. Mixed models with random intercepts and random slopes were used to evaluate the association between baseline obesity status and eGFR trajectories (calculated from serum creatinine at 5 visits). Cox proportional hazards models were used to estimate the hazard ratios (HRs) of end-stage kidney disease (ESKD) associated with baseline obesity status.

**Results** At baseline, participants had a mean age of 54 years, median eGFR of 103 ml/min/1.73 m², and median BMI of 27 kg/m². Over 30 years follow-up, all obesity measures showed some associations with more rapid eGFR decline with PPF showing the most consistent associations across race-sex subgroups. All obesity indicators were associated with increased risk of ESKD for all race-sex groups (p trend<0.05). For example, the HRs (95% CI) of ESKD per SD of PPF were 1.20 (1.05, 1.37) for WM, 1.54 (1.31, 1.80) for WF, 1.67 (1.45, 1.92) for AAM, and 1.62 (1.42, 1.84) for AAF. **Conclusion** In summary, obesity status is a risk factor for future decline in kidney function and development of ESKD in community-dwelling adults with PPF showing some advantages over BMI and WHR.


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**Funding Component:**

**P252**

**Stress Echocardiography in Assessment of Symptoms in Obese Patients**

**Stephanie Windish,** Steven Smart, St Louis Univ, St Louis, MO

Introduction: Obesity and obesity related illness continues to be an epidemic in the United States and worldwide. Obesity carries substantial risk of cardiovascular disease (CVD), and symptoms (shortness of breath, decreased exercise tolerance, etc) related to CVD can be nonspecific. Stress testing may identify the cause of these symptoms in obese patients (body mass index (BMI) > 30.) Stress echocardiography has evolved to be capable of comprehensive hemodynamic assessment as well as functional and myocardial perfusion analysis and may be ideal for symptom evaluation in the obese.

**Methods:** 1,615 consecutive patients (52% women, age 61±1 yrs, BMI 28±6) underwent stress perfusion ECHO (treadmill in 913, supine bike in 623 and dobutamine in 79 patients) between 2012 and 2014. Imaging included contrast/perfusion imaging and multi-method assessment of regional and global left and right heart systolic and diastolic function, left
ventricular (LV) volumes, quantitative valve function, left and right heart pressures, peak/mean pulmonary artery pressures, pulmonary vascular resistance, and LV mass. Standard statistical methods were used.

Results: Of the 1,615 patients analyzed, 516 (32%) were obese patients (BMI 36±5) and in the obese group females were 48% (vs 53% in non-obese). Both groups underwent similar stress modalities (58% vs 56% treadmill, 6% vs 4% dobutamine, and 36% vs 40% bike). Diabetes (21% vs 10%) and hypertension (57% vs 44%) were more common in obese (p<0.05). LV mass is disproportionately higher (113±30 vs 97±33 gm/M2) in obese patients (P<0.01). Additionally, obese patients had statistically significant findings (p<0.01) of LV hypertrophy (62% vs 26%), diastolic dysfunction (65% vs 44%), and at least moderate pulmonary hypertension (48% vs 34%). Overall, abnormal tests were more common in obese (83% vs 59%, p<0.01). Multiple abnormalities were more common (p<0.01): 1-3 abnormalities (13% vs 16%) and > 4 abnormalities (70% vs 43%). Unexpectedly, the data showed no statistically significant difference between obese and non-obese in the incidence of ischemia (10% vs 11%), myocardial infarction (5% vs 4%), and cardiomyopathy (6% vs 5%).

Conclusions: Comparative analysis of the data from stress ECHO revealed obese patients had disproportionally higher LV mass index/LV hypertrophy. Stress testing provoked worse diastolic dysfunction and much worse pulmonary vascular dysfunction in the obese patients. The triad of LV hypertrophy/diastolic dysfunction/pulmonary vascular disease with provoked moderate to severe pulmonary hypertension was the main cause of symptoms in obese patients. Hemodynamic stress ECHO is the ideal modality for evaluation of nonspecific symptoms of CVD in obese patients, as it can classify the cause of symptoms and the extent of pathology. Thereby, it may be the ideal test to guide treatment.

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P253

The Association of Goal-Striving Stress With Measures of Adiposity in the Jackson Heart Study

Loretta R Cain, Univ of Mississippi Medical Ctr, Jackson, MS; LáShauntá Glover, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Joshua Joseph, The Ohio State Univ Wexner Medical Ctr, Columbus, OH; Alain Bertoni, Wake Forest Univ, Winston-Salem, NC; Mario Sims, Univ of Mississippi Medical Ctr, Jackson, MS

Introduction. Obesity is a public health epidemic, with a US prevalence of 39.8%. African Americans (AAs) have an even greater prevalence of obesity (46.8%), when compared to non-Hispanic whites at (37.9%). Behavioral risk factors, such as poor diet and sedentary lifestyle, are important antecedents to obesity, but psychosocial risk factors such as stress and perceived discrimination are also determinants of obesity. Goal-striving stress, (GSS), the difference between aspiration and achievement, weighted by the level of disappointment if goals are not reached, may be an important stressor among AAs that may influence measures of adiposity; however, this has yet to be explored. The objective of this study was to examine the relationship between GSS and measures of adiposity in AAs.

Hypothesis. GSS is positively associated with measures of adiposity, including BMI, waist circumference, waist-to-height ratio (WHR), and neck circumference.

Methods. We analyzed data from the baseline exam of the Jackson Heart Study (JHS; n=5306), an AA sample of women and men, 35-84 years old. GSS was derived assessing the difference between aspiration for the following year and current achievement (both using a 10-point scale), weighted by a disappointment is achievement is not reached, using 4-point scale.
GSS was then divided by the standard deviation (SD) (5.05) to create GSS-SD units. BMI was measured in kg/m² and waist and neck circumference was measured in cm. WHR was derived from waist circumference and height measured in cm. We excluded participants with missing data on GSS, measures of adiposity, and covariates. Spline regression analyses were used to obtain the coefficient. Models were adjusted for sex, age, socioeconomic status, alcohol, smoking, physical activity, nutrition, hypertension, diabetes, history of cardiovascular disease, and discrimination.

**Results.** There were 4360 participants included in this analysis; 64.29% female with a mean (±SD) age of 55.47 (± 12.57) years and mean BMI of 31.85 (±7.20) kg/m², mean waist circumference of 100.75 (±16.14) cm, mean WHR of 59.80% (± 9.78), and mean neck circumference of 38.53 (±3.76) cm. After full adjustment, significant results show a positive association of GSS with waist circumference (b=1.30; p=0.0418) and WHR (b=0.80; p=0.0299). GSS was not associated with BMI or neck circumference.

**Conclusion.** GSS was positively associated with measures of adiposity, specifically waist circumference and WHR. Potential interventions should consider the extent to which GSS may contribute to increases in adiposity. Also, future research should explore the longitudinal associations of GSS with measures of adiposity.


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Funding Component:

P255

**Central Fat Distribution and Metabolic Health in Normoglycemic Young Women**

Katherine H Ingram, Janeen S. Amason, Kennesaw State Univ, Kennesaw, GA

**PURPOSE:** The purpose of this pilot study is to test the hypothesis that fat distribution, rather than overall obesity, is strongly related to insulin sensitivity in young, normoglycemic women.

**METHODS:** Thirty-eight non-diabetic young women completed the study (ages 20.7 ±2.8 years; BMI 27.6 ±3.6; 44% Caucasian (17 of 38). Matsuda Insulin Sensitivity Index was calculated from plasma glucose and insulin at 0, 30, 60, and 90 minutes after ingestion of 75g glucose, using established formula, to estimate whole body insulin sensitivity. Whole body and regional adipose tissue was assessed via DXA, abdominal ultrasound of intra-abdominal and pre-peritoneal adipose depots, circumference measures, and skinfold measures. ANOVA was used to assess mean differences among tertiles of Matsuda Index. Partial correlations were controlled for age and race, then additionally controlled for DXA percent body fat to assess associations of fat distribution independent of overall obesity. RESULTS: ANOVA revealed a higher waist circumference (83.8 ±7.8cm vs. 75.6 ±7.2), waist/hip ratio (0.777 ±0.48 vs. 0.716 ±0.05 ), waist/height ratio (0.524 ±0.028 vs. 0.468 ±0.043), ultrasound intra-abdominal thickness (3.57 ±1.3 vs. 2.48 ±1.1) in the least insulin-sensitive tertile, when compared to the most insulin-sensitive tertile, while age, BMI, and other measures of adiposity were comparable among the three groups. Partial correlations controlled for age and race revealed strong negative relationships between Matsuda Index and measures of upper-body and central adiposity, including waist circumference (r=-.416, p<0.05), waist/hip ratio (r=-.500, p <0.01), waist/height ratio (r=-.431, p<0.05), IAAT (r=-.412, p<0.05), PPAT (r=-.381, p<0.05), but not BMI (r=-.173, p=ns) or overall percent fat (r=-.132, p=ns). When further controlled for percent body fat, correlations persisted between Matsuda and waist circumference (r=-.433, p<0.05), waist/hip ratio (r=-.488, p<0.01), waist/height ratio (r=-.470, p <0.01), intra-abdominal fat thickness (r=-.394, p<0.05) and pre-peritoneal fat thickness (r=-.361, p=0.05). CONCLUSIONS: Central and upper-body fat distribution, independent of...
overall obesity, is strongly associated with metabolic health in young non-diabetic women. These data underscore the clinical utility of central adiposity as a marker of metabolic health.

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P257

Acute Type A Aortic Dissection: Post-Repair Quality of Life and Its Association With Post-Traumatic Stress Disorder, Exercise and Sexual Activity

Selena R Pasadyn, Eric Roselli, Amanda Artis, Karen Hurley, Eugene Blackstone, Cleveland Clinic, Hinckley, OH

Introduction Aortic dissection (AD) classically presents with abrupt onset of symptoms immediately followed by major emergency surgery. This can be physically and mentally traumatic. Little is known about the post-repair Quality of Life (QOL) of patients and its association with exercise, post-traumatic stress disorder (PTSD), and sexual activity. Our objective was to describe these associations.

Methods There were 295 identified patients who survived acute type A aortic dissection repair. All were surveyed and 132 responded. Included was the Veterans RAND 12-item Health Survey (VR-12). Also included was a validated screening tool to identify PTSD (PC-PTSD) and questions about exercise and sexual activity. The VR-12 produces physical and mental health QOL summary scores (PCS and MCS) that are standardized using a T-score metric with mean of 50+10. Wilcoxon signed rank tests were used to test if median PCS and MCS scores were equal to 50. Kruskal-Wallis tests were used to test for associations between QOL and PTSD, post-AD exercise status, and limited sexual activity. Hodges-Lehmann (HL) estimates of the location shifts between the two groups and their 95% CIs are also provided as (HL [lower CI, upper CI]). Skewed distributions are presented as median [15th, 85th] percentiles. Results Median PCS (40.1 [25.9, 51.2]) was significantly lower than 50 (P<.0001). There was no statistical difference between median MCS (54.6 [33.9, 61.4]) and 50 (P=0.2454). The median PCS QOL score was significantly lower in AD patients who screened positive for PTSD than those who did not (HL: -9.3 [-14.0, -4.1], p=0.0008). The same was true for the median MCS score (HL: -17.0 [-23.1, -10.0], p<.0001). The median PCS QOL score was significantly higher in AD patients who were exercisers than those who were not (HL: 6.8 [2.4, 11.1], p=.0015). The same was true for the median MCS score (HL: 4.2 [1.0, 7.8], p=.0095). The median PCS QOL score was significantly lower in AD patients experiencing limited sexual activity after their dissection than those who did not (HL: -8.0 [-12.6, -4.3], p=.0002). The same was true for the median MCS score (HL: -5.5 [-10.5, -1.8], p=.0026).

Conclusions The traumatic and debilitating nature of AD and its emergency repair results in lower physical, but not mental, QOL scores than the general population. Lower physical and mental scores are also associated with PTSD, non-exercisers and limited sexual activity in this population. To promote physical and mental QOL in these patients, physicians should investigate and treat PTSD, encourage exercise, and promote resumption of sexual activity when safe.


Funding: No

Funding Component:

P258
Novel Dual-task Balance Challenge to Prevent Falls in Older Adults With Cardiovascular Disease Risk Factors


Background: Fall injuries are responsible for significant health care utilization, disability, loss of independence, and high costs among community-dwelling older adults with cardiovascular disease risk factors (CVD-RF). A Matter of Balance (MOB) is a national community-based fall prevention program, which focuses on cognitive restructuring to manage concerns about falling, but does not include a balance-training component. We hypothesize if MOB added to a dual-task balance challenge (DTBC) comprising weight transfer using fixed and random ordering of ankle reaching tasks, while simultaneously challenging attention—would lead to reduced fall risk.

Objectives: To assess participants’ acceptance and satisfaction with the 4-week MOB and MOB plus DTBC interventions, safety and adherence, and examine changes in fall risk (balance, gait, and fear of falling) post-intervention.

Methods: A single-blind, two-group, randomized pilot study, among community-dwelling older adults with CVD-RF at high fall risk. MOB classes were 2-hours, 2x/week for 4 weeks, with 15 minutes of social time. MOB+DTBC classes followed the same curriculum with 15 minutes of ankle reaching tasks while simultaneously challenging attention. Acceptability and satisfaction were obtained by self-report, study staff monitored safety and adherence during class. Balance and gait were objectively assessed using LEGSys™ (BioSensics, LLC), while the Falls Efficacy Scale International (FES-I) assessed fear of falling. We used t-tests for continuous variables and Fisher’s exact test for categorical variables.

Results: At high fall risk older adults (n=16, mean age=74±8 years), mainly retired (95%, n=15), women (88%, n=14), with >13 years education (81%, n=13), diabetes (25%, n=4), dyslipidemia (70%, n=12), and hypertension (63%, n=10) completed the study (drop-outs, n=1). Participants reported high levels intervention acceptability and satisfaction (mean score=9±1.3, 1=least, 10=most), no safety issues (0%), with very high adherence rates (>94%), regardless of group assignment. Participants in the MOB group (n=7) had no significant within group changes in fall risk post-intervention (p>0.05). Conversely, participants in the MOB plus DTBC group (n=9) had significant improvements in balance (eyes open test=ankle sway, p=0.02; eyes closed test=hip sway, p=0.03 and center of mass, p=0.01) and gait (fast pace=stride time, p=0.04 and double support, p=0.02), with less fear of falling (p=0.04) post-intervention, when compared to baseline.

Conclusions: Reducing fall risk factors and preventing falls are essential for older adults with CVD-RF, to ensure that they continue to live safely and independently. The addition of DTBC to the nationally-used standard MOB curriculum may enhance both balance and cognitive function, and lead to reduced fall risk among community-dwelling older adults with CVD-RF.


Funding: No

Funding Component: P259

Associations of Prior Head Injury With Physical Functioning
**Introduction:** Head injury is associated with significant morbidity and mortality. However, associations of prior head injury with current physical functioning are less clear.

**Hypothesis:** We hypothesized that persons with prior head injury would have greater impairment in physical functioning, particularly with functions requiring more complex thinking and organizational skills (e.g., managing money), compared to persons without head injury.

**Methods:** We performed cross-sectional analyses of 6,293 participants in the 2011-2014 National Health and Nutrition Examination Surveys (NHANES), a nationally representative sample of noninstitutionalized civilian U.S. adults aged ≥40 years. Prior head injury was self-reported by the question, “Have you ever had loss of consciousness because of a head injury?” Measures of physical functioning were assessed by standard questions. We used logistic regression models to estimate associations and all analyses incorporated survey weights to account for the NHANES sampling design.

**Results:** Overall, participants were a mean age of 57 years, 52% were women, 9% were black, and 15.3% had a history of head injury. Persons with a prior head injury were more likely to have limitations in any activity due to a physical, mental, or emotional problem (OR 1.88, 95% CI 1.54-2.29; Table). Persons with a history of head injury were more likely to have difficulty walking up ten steps (OR 1.58, 95% CI 1.07-2.34), walking between rooms on the same floor (OR 2.68, 95% CI 1.02-7.03), performing household chores (OR 1.54, 95% CI 1.02-2.33), dressing (OR 1.75, 95% CI 1.17-2.62), managing money (OR 2.20, 95% CI 1.38-3.51), or attending social events (OR 2.48, 95% CI 1.47-4.19).

**Conclusions:** Prior head injury is a potent risk factor for disability and has a strong link to limitations in physical, mental, and emotional functioning. Prospective studies are needed to better characterize the temporality of these observed associations.

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**NEFAs, Incident Disability, Mobility Limitation and Frailty**

**Peter Ahiawodzi**, Campbell Univ, Buies Creek, NC; Luc Djousse, Brigham and Women’s Hosp, Boston, MA; Joachim Ix, Univ of California, San Diego, CA; Jorge Kizer, Univ of California San Francisco, San Francisco, CA; Russell Tracy, Univ of Vermont, Burlington, VT; Alice Arnold, Univ
Background: Non-esterified fatty acids (NEFAs) play central roles in the relationship between adiposity and glucose metabolism and have been implicated in the pathogenesis of cardiovascular disease, but few studies have assessed their effects on complex geriatric syndromes like frailty that cross multiple organ systems. We sought to determine the relationships between NEFAs and incident frailty, disability, and mobility limitation in a population-based cohort of elders. Methods: We measured circulating total NEFAs in 2742 non-frail Cardiovascular Health Study (CHS) participants (mean age 74 years) from stored samples collected in 1992-3. Participants underwent assessment of frailty again in 1996-7 and continue to report their activities of daily living and mobility restrictions. We used ordinal logistic regression to model frailty and Cox regression was used to model disability and mobility limitation in relation to baseline NEFAs. To minimize departure from proportional hazards, we truncated follow-up at 9 years for disability and 6.5 years for mobility limitation. Results: A total of 251 participants became frail and 1411 became pre-frail over a four-year period, and we documented 1448 cases of disability and 1609 cases of mobility limitation during follow-up. NEFAs were positively associated in a dose-dependent manner with higher risks of incident frailty, disability, and mobility limitation. The adjusted odds ratios for frailty were 1.31 (95%CI=1.07-1.61, p=0.01) across extreme tertiles and 1.13 (95%CI=1.04-1.23, P=0.004) per standard deviation increment. The corresponding hazard ratios for incident disability were 1.40 (95%CI=1.05-1.87, p=0.02) and 1.22 (95%CI=1.09-1.37, P=0.001), while those for incident mobility limitation were 1.28 (95%CI=0.90-1.84, p=0.17) and 1.18 (95%CI=1.02-1.36, P=0.03). Results were largely consistent among both men and women.

Conclusion: Circulating NEFAs are significantly associated with frailty, disability, and mobility limitation among older adults. These results highlight the broad spectrum of adverse health issues associated with NEFA in elders.


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P261

Dietary Sodium, Potassium, and Blood Pressure in Normotensive Pregnant Women: The National Health and Nutrition Examination Survey

Abbi D Lane-Cordova, Lara R Scheider, William Tucker, James Cook, Sara Wilcox, Jihong Liu, Univ of South Carolina, Columbia, SC

Dietary sodium, potassium, and the sodium-to-potassium ratio are linearly associated with blood pressure in non-pregnant adults in a dose-response manner. Earlier investigations suggested null or inverse associations of sodium and blood pressure during normotensive pregnancy, but this finding has not been confirmed in a large, racially diverse group while accounting for counteractive effects of dietary potassium. Our purpose was to determine associations of blood pressure with sodium, potassium and the sodium-to-potassium ratio in normotensive pregnant women. We used cross-sectional blood pressure measurements and dietary data from 984 normotensive pregnant women in multiple cycles of the National Health and Nutrition Examination Survey (mean age=27.6 ± 0.2 years). We used Kruskal-Wallis tests to determine differences in blood pressure across quartiles of sodium intake and linear regression to test for associations of sodium, potassium,
and the sodium-to-potassium ratio with systolic and diastolic blood pressure. Adjustment variables included: age, race, education, marital status, body mass index, smoking, and month of pregnancy. Average duration of pregnancy was 5.6 ± 0.1 months with no difference between quartiles of sodium intake. There was no difference in unadjusted systolic or diastolic blood pressures across quartiles of sodium intake; Quartile 1: 106/56; Quartile 2: 106/55; Quartile 3: 107/57; Quartile 4: 107/56, p>0.60 for all, and no difference in age and race-adjusted systolic or diastolic blood pressures across quartiles of dietary intake, Figure 1. In adjusted regression analyses, sodium (β=0.16, 95%CI: -0.20, 0.52) and potassium (β=0.18, 95%CI: -0.24, 0.60) intake and the sodium-to-potassium ratio (β=-0.54, 95%CI: -1.55, 0.47) were not associated with systolic or diastolic blood pressure in normotensive pregnant women. Results were similar in analyses stratified by race/ethnicity. Blood pressure may be insensitive to sodium and potassium intake during normotensive pregnancy.


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Funding Component: National Center

P262

Parity and Ideal Cardiovascular Health: The Multi-Ethnic Study of Atherosclerosis

Oluseye Ogunmoroti, Johns Hopkins Univ, Baltimore, MD; Olatokunbo Osibogun, Florida Intl Univ, Miami, FL; Olamide Kolade, Alton Memorial Hosp, Alton, IL; Wendy Ying, Garima Sharma, Dhananjay Vaidya, Erin D. Michos, Johns Hopkins Univ, Baltimore, MD

Background: Parity (null or grand multiparity) is associated with an increased cardiovascular disease (CVD) risk through several biological pathways. The American Heart Association’s Life’s Simple 7 (LS7) metrics are a useful framework for the promotion of ideal cardiovascular health (CVH). However, the effects of parity on CVH are uncertain. We examined the association between parity and ideal CVH among an ethnically diverse group of middle to older aged women free of CVD at baseline. Methods: We analyzed cross-sectional data of 3,430 women aged 45 to 84 years enrolled in the Multi-Ethnic Study of Atherosclerosis. Parity was self-reported, defined as the total number of live births, and categorized as 0, 1-2, 3, 4 and ≥5. The LS7 metrics (smoking, physical activity, body mass index, diet, blood pressure, total cholesterol and blood glucose) were each categorized into ideal (2 points), intermediate (1 point) and poor (0 points). A total score of 0-8 was considered inadequate; 9-10, average and 11-14, optimal for CVH. The number of metrics in the ideal category was also counted. Multinomial logistic regression was used to examine the association between parity and CVH measured by the score and number of ideal metrics. Results: Mean age (SD) was 62 (10) years. Using women with 1-2 live births as reference, for nulliparous women, the odds of having an average CVH score were 38% higher, while for women with a history of 3
and ≥5 live births, the odds of having optimal CVH were 26% and 54% lower, respectively (Table). Additionally, women with ≥5 live births were less likely to achieve 5 ideal metrics [OR 0.39 (0.21-0.69)], with a similar trend for 6-7 ideal metrics [0.41 (0.16-1.07)]. Test for interaction by race/ethnicity was not significant (p=0.3).

Conclusion: While there was not a strong graded association of parity and CVH scores, our data suggest that women with ≥5 live births are less likely to achieve optimal CVH and greater numbers of ideal metrics. More research will be required to explore the mechanisms by which parity improves or worsens CVH.

### Disclosures:


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Funding Component:

P263

### Gestational Diabetes and Patterns of Cardiometabolic Risk Factors Before and After Childbearing: Coronary Artery Risk Development in Young Adults Study

Baiyang Sun, Marnie Bertolet, Univ of Pittsburgh, Pittsburg, PA; Cora E Lewis, Univ of Alabama at Birmingham, Birmingham, AL; Janet M Catov, Univ of Pittsburgh; Magee-Women’s Res Inst, Pittsburgh, PA; Erica P Gunderson, Kaiser Permanente Northern California, Div of Res, Oakland, CA

**Introduction:** Cardiometabolic risk factor levels before pregnancy affect risk of gestational diabetes mellitus (GDM), and unfavorable risk factors have been found after pregnancy. However, changes in risk factors during both the pre- and post-childbearing periods have not been evaluated longitudinally in prospective studies. **Hypothesis:** Women who develop GDM pregnancy exhibit less favorable patterns of CVD risk factors during both pre- and post-childbearing eras. **Methods:** We used data from CARDIA, a multi-center, longitudinal cohort of black and white young adults initially aged 18-30 with serial in-person exams across 30 years (9 exams, 1985-2016). Women with ≥1 births after baseline (n=1288) self-reported GDM and were classified as “ever” GDM (n=148, at least one GDM pregnancy) and as non-GDM (all non-GDM births; n=1140). Piecewise linear mixed-models, which allowed differing intercepts and slopes for pre- and post-childbearing eras, compared GDM group to non-GDM group on annual changes in CVD risk factor (BMI, waist circumference [WC], lipids, and blood pressure) during pre-childbearing period (before the first post-baseline birth) and post-childbearing period (after the last post-baseline birth). Models adjusted for baseline socioeconomics, length of childbearing period (from the first to the last post-baseline birth), parity, time-varying lifestyle habits and medication use.

**Results:** Annual BMI increase before initiation of childbearing was higher in GDM group than non-GDM group (0.35 vs 0.23 kg/m²/year; p=0.03). Similarly, WC showed marked pre-childbearing increase for GDM group compared to non-GDM group (0.82 vs. 0.54 cm/year; p=0.04). In contrast, the annual increase in BMI and WC after childbearing did not differ by GDM history. No differences were detected for the other CVD risk factors. **Conclusions:** Accelerated gains in overall and central adiposity before the childbearing period was associated with elevated risk of GDM, but risk

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P263
factor changes do not show differences after childbearing.

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P264

Metal Exposures and Preeclampsia in the Boston Birth Cohort

Tiange Liu, Dept of Epidemiology, Johns Hopkins Bloomberg Sch of Public Health; Welch Ctr for Prevention, Epidemiology and Clinical Res, Johns Hopkins Univ, Baltimore, MD; Mingyu Zhang, Dept of Epidemiology, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Eliseo Guallar, Dept of Epidemiology, Johns Hopkins Bloomberg Sch of Public Health; Welch Ctr for Prevention, Epidemiology and Clinical Res, Johns Hopkins Univ, Baltimore, MD; Guoying Wang, Xiumei Hong, Ctr on the Early Life Origins of Disease, Dept of Population, Family and Reproductive Health, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Xiaobin Wang, Ctr on the Early Life Origins of Disease, Dept of Population, Family and Reproductive Health, Johns Hopkins Bloomberg Sch of Public Health; Dept of Pediatrics, Johns Hopkins Sch of Med, Baltimore, MD; Noel T Mueller, Dept of Epidemiology, Johns Hopkins Bloomberg Sch of Public Health; Welch Ctr for Prevention, Epidemiology and Clinical Res, Johns Hopkins Univ, Baltimore, MD

Introduction: Preeclampsia is a leading cause of maternal and perinatal morbidity and mortality, accounting for 50,000-60,000 deaths per year worldwide. Animal studies have linked metal exposures to its development but epidemiologic studies have had inconsistent findings. We assessed the associations between metal exposures and preeclampsia in a prospective cohort.

Methods: A total of 1,346 women from the Boston Birth Cohort (enrolled from 1998 to 2018) had complete data on the exposures and outcome and were free of both chronic and gestational hypertension. Metal exposures, including manganese (Mn), cadmium (Cd), lead (Pb), mercury (Hg), and selenium (Se) were measured from red blood cells (RBCs) collected within 1 to 3 days after delivery. Preeclampsia (including HELLP syndrome) diagnosis was ascertained from medical records. Logistic regression models were fitted for each metal. Covariates adjusted for included age at delivery, race, pre-pregnancy body mass index, education, parity, and smoking status during pregnancy.

Results: A total of 119 (8.84%) women developed preeclampsia. A 1 standard deviation (SD) (15.42 μg/L) increase in RBC Mn was associated with a 0.71 (95% confidence interval (CI): 0.56, 0.90) times lower odds of preeclampsia. Compared to the 1st quintile of RBC Mn, the 5th quintile was associated with 0.39 (95% CI: 0.20, 0.76) times lower odds of preeclampsia. In contrast, a 1 SD (0.68 μg/L) increase in RBC Cd was associated with a 1.17 (95% CI: 0.94, 1.46) times higher odds of preeclampsia, and the odds for the 5th quintile of RBC Cd was 2.04 (95% CI: 1.03, 4.04) times higher than the 1st quintile (Figure). Null associations were observed for RBC Pb, Hg and Se.

Conclusion: RBC Mn was associated with lower odds of preeclampsia, while Cd was associated with higher odds. Findings from this study help elucidate potentially modifiable causes of preeclampsia and inform interventions to reduce the burden of this important pregnancy complication.
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P265

**History of Hypertensive Disorders of Pregnancy and Early Manifestation of Vasomotor Symptoms 8-10 Years Post Delivery**

Vanessa Assibey-Mensah, Rebecca C. Thurston, Janet M. Catov, Univ of Pittsburgh, Pittsburgh, PA

**Introduction:** Women with hypertensive disorders of pregnancy (HDP) have excess cardiovascular disease (CVD) risk in the years following delivery compared with women with uncomplicated pregnancies, with black women having excess burden of both HDP and CVD. After pregnancy yet prior to the menopause transition, nearly 30% of women in their late reproductive years report having vasomotor symptoms (VMS) including night sweats and hot flashes. VMS, particularly, early-onset VMS, have also been associated with increases in blood pressure and subclinical CVD. However, it is unknown if underlying vascular dysfunction in women with a history of HDP may increase the risk of VMS and contribute to racial differences in symptom manifestation.

**Hypothesis:** Women with a history of HDP will have an increased risk of VMS as compared with women without a history of HDP.

**Methods:** Women with a singleton live birth at Magee-Womens Hospital (Pittsburgh, PA) during 2008-2009 were enrolled 8-10 years post-delivery (median age=37.5; interquartile range=8.0) in our ongoing prospective cohort study assessing maternal cardiometabolic and microvascular disease (n=312). Using log-binomial logistic regression, we estimated the risk of VMS associated with history of HDP, adjusting for race, body mass index, current smoking, age, and education. Additional adjustment was made for current hormonal contraceptive use. Women with single or double oophorectomy (n=7) were excluded in a sensitivity analysis. Given the excess burden of HDP and CVD, as well as early-onset VMS in black women, we also assessed effect measure modification by maternal race.

**Results:** Thirty percent of women with a history of HDP reported having vasomotor symptoms compared with 18% of women without a history of HDP. This excess risk of VMS persisted after accounting for covariates (adjusted risk ratio (aRR) 1.61, 95% confidence interval (CI) 1.06, 2.47). Excess risk of VMS persisted in women with a history of HDP after excluding those with a single or double oophorectomy (aRR 1.60, 95% CI 1.03, 2.47). Additional adjustment for hormonal contraceptive use resulted in a non-statistically significant increased risk of VMS (aRR 1.59, 95% CI 0.98, 2.59). Race did not modify the association between history of HDP and VMS (P value for interaction = 0.79).

**Conclusions:** History of HDP was associated with excess risk of VMS in young women prior to menopause transition. There may be common underlying vascular changes that contribute to HDP and VMS that may also place women at future risk for CVD. How these reproductive factors may converge and be related to excess cardiometabolic risk warrants additional study.

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Yes

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Biomarkers of Vitamin D3 C-3 Epimers During Pregnancy and the Risk of Gestational Diabetes Mellitus: A Longitudinal Study in a Multiracial Cohort

Jin Xia, Yiqing Song, IU Fairbanks Sch of Public Health, Indianapolis, IN; Jing Wu, Glotech Inc, Rockville, MD; Stefanie Hinkle, Mengying Li, Epidemiology Branch, Div of Intramural Population Health Res, Eunice Kennedy Shriver Natl Inst of Child Health and Human Development, Natl Insts of Health, Bethesda, MD; Michael Y. Tsai, Dept of Lab Med and Pathology, Univ of Minnesota Medical Sch, Minneapolis, MN; Cui lin Zhang, Epidemiology Branch, Div of Intramural Population Health Res, Eunice Kennedy Shriver Natl Inst of Child Health and Human Development, Natl Insts of Health, Bethesda, MD

Introduction Recent evidence suggests that the C-3 epimer of 25 hydroxyvitamin D3 [3-epi-25(OH)D3] is detectable in a variety of populations and correlates with 25(OH)D3. However, little is known on its status across different trimesters of pregnancy and its pre-diagnostic value in predicting risk of gestational diabetes (GDM). Hypothesis We aimed to determine whether lower levels of 3-epi-25(OH)D3 during early to mid-pregnancy were associated with higher risk of developing GDM.

Methods We conducted a nested case-control study of 107 GDM cases and 214 matched controls within the NICHD Fetal Growth Studies-Singleton Cohort (2009-2013). Plasma concentrations of 3-epi-25(OH)D3 [limit of detection (LOD) = 2.25 nmol/L (0.9 ng/mL)] and 25(OH)D3 were measured at gestational weeks (GWs) 10-14, 15-26, 23-31, and 33-39. The LOD/V2 substitution method was applied to impute the non-detects. Relative C-3 epimer contribution [i.e., the percentage of total 25(OH)D3 accounted for by 3-epi-25(OH)D3] was calculated as: [3-epi-25(OH)D3/(3-epi-25(OH)D3+25(OH)D3)] * 100. Linear mixed-effects models and conditional logistic regression models were used to assess the associations of longitudinal change of 3-epi-25(OH)D3 with GDM risk after adjusting for conventional GDM risk factors. Results Overall, approximately 75.1% of participants had detectable 3-epi-25(OH)D3 ranging from 2.41-22.43 nmol/L and relative C-3 epimer contribution ranged from 2.55%-19.76%. While median concentrations of 3-epi-25(OH)D3 increased slightly with gestational ages throughout pregnancy, relative C-3 epimer contribution decreased from GWs 10-14 to GWs 15-26 with a subsequent increase until the end of gestation among both cases and controls. There were no significant differences between GDM cases and controls in C-3 epimer (median: 4.48 vs. 4.56 nmol/L) or in relative C-3 epimer contribution (5.68% vs. 5.76%) during the first two study visits (all P > 0.05). After imputation, we consistently observed no associations of 3-epi-25(OH)D3 (GWs 10-14, ORadj = 0.90, 95% CI: 0.59-1.37; GWs 15-26, ORadj = 1.05, 95% CI: 0.64-1.71) or the relative C-3 epimer contribution (GWs 10-14, ORadj = 1.39, 95% CI: 0.95-2.04; GWs 15-26, ORadj = 1.36, 95% CI: 0.90-2.06) with GDM. Overall, there was no significant difference in longitudinal change of 3-epi-25(OH)D3 and the relative C-3 epimer contribution between cases and controls from GWs 10-14 weeks to 15-26 weeks (all P ≥ 0.09). In addition, we observed no significant joint association between 3-epi-25(OH)D3 and total 25(OH)D with GDM risk at either GWs 10-14 or GWs 15-26. Conclusions Our longitudinal study showed that early and mid-pregnancy biomarkers of 3-epi-25(OH)D3, independently or jointly with total 25(OH)D3, were not associated with GDM risk in US women. Our findings do not support potential clinical usefulness of 3-epi-25(OH)D3 biomarkers in predicting GDM risk.


Funding: No
Lifestyle Program Improves Sleep Quality in Participants With a History of Concussion

Francisco E Ramirez, Neil Nedley, Nedley Clinic, Colfax, CA; Lance Hofer-draper, Weimar Inst, Colfax, CA

**Background** Patients with a history of concussion are susceptible to insomnia. This study documents how lifestyle changes could improve insomnia. **Methods** The educational depression program is an 8-week community educational program which addresses optimal health through diet, exercise, sleep hygiene, light therapy, and mental/spiritual health. Participants met once a week for 2 hours over an 8 week period. During the first hour, participants listened to a health lecture by a health professional and then divided in small groups. The hypothesis of the program is to try to understand the causes of mental health problems and educating participants on how to apply lasting changes to their daily lives to address these problems. From n=5,861 participants who finished the program, n=275 participants had a history of concussion and their data was used. They answered an 85 question questionnaire at baseline and again at the end of the program that included participant history and measured depression and anxiety. Participants were asked about their sleeping patterns, on a scale of 0-3; 0 being excellent sleep patterns, and 3 being bad sleep patterns. **Results** Mean age for those with a history of concussion (n=275) was 52.9 (SD 15.7), and 71% were females. Sleep patterns at baseline for those with concussion were: n=48 had excellent sleep, n=30 had good sleep, n=79 had below average sleep, n=118 had bad sleep, and average baseline anxiety was 9.6 (moderate) SD 5.2. At the end of the program, the same test was administered and sleep was: n=111 reported excellent, n=60 had good, n=55 had below average, n=49 had bad, and end mean anxiety was 5.5 (mild) SD 4.1 **Conclusion** The program effectively improves sleep quality in most of the participants. Lifestyle seems to be an important factor in improving insomnia in these participants. Anxiety levels also decreased and may have played a role in the improvements in sleep. Long-term follow-up is planned.

Disclosures: **F.E. Ramirez**: None. **N. Nedley**: F. Ownership Interest; Modest; Owner of Nedley Health Solutions. **L. Hofer-draper**: None.

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Funding Component:

Long and Short Sleep and Obesity in the Women’s Health Study

Eva M Durazo, UCSF, San Francisco, CA; Tiffany M Powell-Wiley, NIH - NHLBI, Bethesda, MD; Susan Redline, Harvard Medical Sch, Boston, MA; Natalie Slopen, Univ of Maryland, Sch of Public Health, College Park, MD; Aric Prather, UCSF, San Francisco, CA; David R Williams, Harvard, T.H. Chan Sch of Public Health, Boston, MA; Julie E Buring, Harvard; Brigham and Women's Hosp, Boston, MA; Michelle A Albert, UCSF, San Francisco, CA

**Background**: Although evidence suggests that extremes of sleep (i.e. long and short) are associated with cardiovascular disease-related risk factors in the general population, research examining the association between the extremes of sleep and obesity in older women is limited. **Methods and Results**: We used the Women’s Health Study (WHS) 2012-2013 follow-up cohort of 21,726 older women (mean age = 72.1 ± 6.0 years old) to examine the cross-sectional association between extremes of sleep and obesity. Women with cancer or missing body mass index (BMI) data were excluded. Long sleep was defined as > 9 hours/day, short sleep as < 6 hours/day, and sleep of 6-9 hours/day was the reference. Sleep duration and BMI
were self-reported measures. Approximately 23.3% of women were obese (BMI ≥ 30 kg/m²). Overall, women who were obese and had either long or short sleep were less likely to exercise, and more likely to have history of diabetes, depression symptoms, and lower education and income levels. Women who were obese and long sleepers were more likely to use alcohol and have history of hypertension, while short sleepers were more likely to be current smokers. Logistic regression analyses revealed that older women with long sleep and short sleep had 30% higher odds of obesity, respectively, compared to women who slept 6-9 hours, adjusting for age and race/ethnicity. These relationships were attenuated and lost significance when controlling for potential important confounders (Table 1).

Conclusion: Older women reporting extremes of sleep had higher odds of obesity compared to women who sleep 6-9 hours, after control for age and race/ethnicity. Further adjustment for traditional cardiovascular risk factors and socioeconomic parameters resulted in loss of significance.

Table 1. Odds Ratios of Long and Short Sleep and Obesity in the Women’s Health Study (2012-2013).

<table>
<thead>
<tr>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep 5-6 h/day</td>
<td>Sleep &gt; 9 h/day</td>
<td>Sleep &lt; 6 h/day</td>
<td></td>
</tr>
<tr>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td>1.60 (1.18-2.16)</td>
<td>1.33 (0.90-1.95)</td>
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</tr>
<tr>
<td>1.00</td>
<td>1.42 (1.21-1.66)</td>
<td>1.22 (0.90-1.67)</td>
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</tr>
<tr>
<td>1.00</td>
<td>3.18 (1.65-6.15)</td>
<td>1.12 (0.90-1.40)</td>
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</tr>
<tr>
<td>1.00</td>
<td>3.75 (2.03-6.93)</td>
<td>1.04 (0.33-3.13)</td>
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</tr>
<tr>
<td>1.00</td>
<td>3.05 (1.51-6.13)</td>
<td>1.02 (0.39-2.66)</td>
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</tr>
<tr>
<td>1.00</td>
<td>3.05 (1.51-6.13)</td>
<td>0.93 (0.39-2.66)</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion: Older women reporting extremes of sleep had higher odds of obesity compared to women who sleep 6-9 hours, after control for age and race/ethnicity. Further adjustment for traditional cardiovascular risk factors and socioeconomic parameters resulted in loss of significance.


Funding: No

Funding Component:

P269

Combined Associations of Objective Sleep Efficiency and Overweight With the Prevalence of Hypertension in Japanese Adults

Takumi Hirata, Tomohiro Nakamura, Mana Kogure, Akira Narita, Tohoku Univ, Sendai, Japan; Ken Miyagawa, Omron Healthcare Co., Ltd., Sendai, Japan; Kotaro Nochioka, Naho Tsuchiya, Taku Obara, Naoki Nakaya, Shinichi Kuriyama, Atsushi Hozawa, Tohoku Univ, Sendai, Japan

Introduction: Poor sleep efficiency is a risk for prevalent hypertension, and also overweight is one of the major risk factors for hypertension. Generally, overweight participants have poor sleep efficiency, and thus, overweight may modify the association between poor sleep efficiency and hypertension. However, there are no previous reports to examine the impact of overweight on the association between poor sleep efficiency and hypertension. Hypothesis: Poor sleep efficiency is associated with increased with prevalent hypertension, particularly in individuals with non-overweight. Methods: We conducted a cross-sectional study of 779 participants aged 20 years or older who lived in Miyagi prefecture, Japan. All the participants were recruited from June 2017 to March 2018. Sleep efficiency was measured by HSL-101 sleep sensor, and then we classified all the participants into four groups according to their sleep efficiency (good; ≥90%/poor; <90%) and the presence or absence of overweight which was defined as BMI of 23 kg/m² or higher based on the Western Pacific Region of WHO criteria for Japanese. Hypertension was defined as morning home blood pressure ≥135/85 mmHg or receiving treatment for hypertension. Multivariable logistic regression models were used to obtain odds ratios (ORs) and 95% confidence intervals (CIs) to assess the combined associations of poor sleep efficiency and overweight with prevalent hypertension. Models were adjusted for sex, age, alcohol drinking status, smoking status, average daily steps, urinary sodium/potassium ratio, and sleep duration. Results: Of the 779 participants...
(68.3% women, mean age 61.0 years), 252 (32.3%) had poor sleep efficiency, 331 (42.5%) had overweight, and 303 (38.9%) had hypertension. The prevalence of poor sleep efficiency was higher in men (41.7% in men vs. 28.0% in women), and the individuals with poor sleep efficiency had a higher proportion of overweight (52.8 % in participants with poor sleep efficiency vs. 37.6 % in those with good sleep efficiency) and shorter sleep duration. In a multivariable analysis, compared with individuals with good sleep efficiency and non-overweight for hypertension, the adjusted ORs (95% CIs) of those with poor sleep efficiency and non-overweight, good sleep efficiency and overweight, and poor sleep efficiency and overweight for hypertension were 1.79 (1.08 to 2.98), 2.99 (1.99 to 4.49), and 4.15 (2.56 to 6.71), respectively. **Conclusions:** Poor sleep efficiency was associated with increased prevalence of hypertension even in individuals with non-overweight, and additionally the risk of poor sleep efficiency for prevalent hypertension in individuals with overweight was relatively higher than that in individuals with non-overweight.

Disclosures:  **T. Hirata:** B. Research Grant; Modest; Omron Healthcare Co., Ltd.  **T. Nakamura:** B. Research Grant; Modest; Omron Healthcare Co., Ltd.  **M. Kogure:** B. Research Grant; Modest; Omron Healthcare Co., Ltd.  **A. Narita:** B. Research Grant; Modest; Omron Healthcare Co., Ltd.  **K. Miyagawa:** A. Employment; Modest; Omron Healthcare Co., Ltd..  **K. Nochioka:** None.  **N. Tsuchiya:** B. Research Grant; Modest; Omron Healthcare Co., Ltd..  **T. Obara:** None.  **N. Nakaya:** B. Research Grant; Modest; Omron Healthcare Co., Ltd..  **S. Kuriyama:** B. Research Grant; Modest; Omron Healthcare Co., Ltd..  **A. Hozawa:** B. Research Grant; Modest; Omron Healthcare Co., Ltd..

Funding: No

Funding Component:

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**P270**

**Neighborhood Socioeconomic Status and Sleep Duration Among U.S. Adolescents: Does the Association Differ by Race?**

**Ryan Saelee,** Julie A. Gazmararian, Dayna A. Johnson, Shakira Suglia, Emory Univ Rollins Sch of Public Health, Atlanta, GA

**Background:** Short sleep duration is linked to adverse cardiovascular risk factors among adolescents and racial disparities in sleep among this group is well documented. Thus, identifying determinants and its differential impact on sleep duration by race may be important for informing sleep interventions and reducing sleep disparities. Evidence suggests neighborhood socioeconomic status (NSES) may play a role in shorter sleep duration among adolescents, but few studies have examined whether this relationship differs by race. Furthermore, previous studies were limited by sample size, geographic representation to specific U.S. cities and racial/ethnic diversity with mostly non-Hispanic White samples. The purpose of our study was to investigate the association between NSES and short sleep duration and determine if this relationship varies by race among a diverse sample of adolescents. **Methods:** Participants (n=17,746) are from Wave I of the National Longitudinal Study of Adolescent to Adult Health, a nationally representative multi-ethnic study of health behaviors during adolescence and outcomes during adulthood. Sleep duration was self-reported as total hours of sleep at night, and categorized as short (6-13 years: <9 hours, 14-17 years: <8 hours, 18-25 years: <7 hours) vs. normal (6-13 years: 9-11 hours, 14-17 years: 8-10 hours, 18-25 years: 7-9 hours ). NSES was a summary z-score consisting of three census-block measures: unemployment rate, proportion of households with income below poverty level, and public assistance. Participants were categorized as living in low (≥median z-score) or high (≤ median z-score) NSES. Log-binomial regression models examined the
association between NSES (low vs. high) and short sleep duration and tested for racial differences. Models adjusted for race, sex, age, and highest parental education. Results: The study population was 51% female, 66% White, 15% African-American, 12% Hispanic, 4% Asian, 3% other racial group, and mean age was 15.4 years (Standard Error=0.11). The prevalence of short sleep duration was 41% and 48% for low NSES. There was no significant association between NSES and short sleep duration before (Prevalence Ratio (PR):1.02; 95% Confidence Interval (CI): 0.96-1.09) and after adjusting for individual sociodemographic characteristics (PR: 1.00; 95% CI: 0.93-1.06). There was also no significant race-by-NSES interaction (p=0.21).

Conclusion: Findings suggests NSES is not associated with short sleep duration regardless of race and that other factors may play a larger role in sleep among this sample of adolescents. The inconsistency with findings from prior studies could be due to our inclusion of a larger, racially diverse, and nationally representative sample. Future studies should explore whether other neighborhood and contextual factors influence sleep and if racial differences exist in these relationships.


Funding: No

Funding Component:

P271

Objective Measured Sleep Phenotypes Are Associated With Cardiovascular Health in Men and Women: Results From the Multi-Ethnic Study of Atherosclerosis Sleep Study

Nour Makarem, Marie-Pierre St-Onge, Columbia Univ Medical Ctr, New York, NY; Cecilia Castro-Diehl, Boston Univ, Boston, MA; Susan Redline, Harvard Medical Sch, Boston, MA; Steven Shea, Columbia Univ Medical Ctr, New York, NY; Donald Lloyd-Jones, Hongyan Ning, Northwestern Univ, Chicago, IL; Brooke Aggarwal, Columbia Univ Medical Ctr, New York, NY

Introduction: Poor sleep patterns are ubiquitous and may play a role in cardiovascular disease etiology through their influence on health behaviors and factors included in the American Heart Association Life’s Simple 7 (AHA LS7). Associations of objectively measured sleep phenotypes with meeting cardiovascular health (CVH) metrics have not been previously examined in a population-based cohort of US men and women. Hypothesis: We hypothesized that sleep duration and continuity, insomnia, and sleep disordered breathing (SDB) would be associated with meeting overall and individual AHA LS7 metrics and that associations would vary by sex. Methods: Data from 1,920 adults (mean age: 68.5 y, 54% female), in the MESA Sleep Study, which coincided with Exam 5 and included questionnaires, overnight polysomnography, and 1 wk of wrist actigraphy, were used. Participants were categorized based on their level of meeting AHA LS7 metrics (smoking, diet, physical activity, BMI, blood pressure (BP), cholesterol, and glucose) as: ideal (2 points), moderate (1 point) or poor (0 points). Metric scores were summed to create an AHA LS7 score such that scores of 0-7, 8-11, and 12-14 represented poor, moderate, and ideal CVH, respectively. Linear and logistic regression models adjusted for age, race/ethnicity, education, health insurance, and alcohol were used to examine associations of sleep with CVH and any differences by sex.

Results: Half of the sample had poor CVH (51%), and 44% and 5% had moderate and ideal CVH, respectively. In logistic models, sleeping <6h/night was associated with 26% higher odds of poor CVH (OR (95%CI): 1.26 (1.01-1.56)). Doctor-diagnosed obstructive sleep apnea and an apnea hypoxia index ≥ 5 events/h (SDB) were associated with 79% and 96% higher odds of poor CVH (OR (95%CI): 1.79 (1.27-2.51) and 1.96 (1.56-2.45), respectively); associations did not vary by sex. Habitual snoring was associated with 44% and 60% higher odds of poor CVH in
the overall sample and in women (OR (95%CI): 1.44 (1.05-1.97) and 1.60 (1.03-2.50)). In linear models, each additional hour of sleep was associated with a higher AHA LS7 score in the overall sample (B=0.09, p=0.019) and in men (B=0.13, p=0.025); while higher sleep maintenance efficiency, a measure of sleep quality, was associated with a higher AHA LS7 score in women (p-interaction <0.05). When sleep patterns were examined in relation to individual CVH metrics, sleeping <6h was associated with not meeting the smoking (p=0.031), BMI (p<0.01), and BP metrics (p=0.022). Insomnia (WHI Insomnia Rating Scale score >10) was associated with not meeting the physical activity metric (p<0.01). SDB was associated with not meeting the BMI, BP and glucose metrics (p<0.01).

**Conclusions:** SDB and shorter sleep were associated with poor CVH and with not meeting BMI, BP, and glucose metrics. Disrupted sleep continuity was associated with lower CVH scores in women.


**Funding:** No

**Funding Component:**

P273

**The Association of Obstructive Sleep Apnea on Cardiac Parasympathetic Responses During Stress Testing: The Multi-Ethnic Study of Atherosclerosis (MESA)**


**Introduction:** Obstructive sleep apnea (OSA) may lead to abnormalities in the balance between sympathetic and parasympathetic activity at night; variation in daytime activity and responses to stress are less understood.

**Hypothesis:** OSA is associated with reduced parasympathetic response from stress challenges.

**Method:** In the Multi-Ethnic Study of Atherosclerosis (MESA) cohort (mean age 68yrs), 413 participants underwent in-home polysomnography. OSA severity was characterized by apnea-hypopnea index (AHI) as mild (5≤AHI<15), moderate (15≤AHI<30), severe (AHI≥30), or no OSA (AHI <5 events/h) (referent). We examined High Frequency (HF)-heart rate variability (HRV), an index of cardiac parasympathetic modulation, during a standardized daytime stress challenge protocol: a baseline period followed by two mental stress tasks, the modified Stroop color-word conflict and an arithmetic task, each followed by a recovery period. We used linear mixed effects model with HF-HRV as outcome.

**Results:** Participants with mild OSA (but not those with moderate or severe OSA) had lower levels of HF-HRV than those with no OSA (−0.36 log msec², 95% CI −0.70, −0.02, P<0.05) at baseline. Those with severe OSA had a smaller increase in HF-HRV during recovery than the no OSA group (−0.34% change, 95% CI −0.63, −0.06, P<0.05) (**Table 1A**). Because OSA related cardiovascular disease may vary by age, a sensitivity analysis separately examining participants ≥65 and < 65 yo suggested that those ≥65 years with mild and moderate OSA had greater HF-HRV reactivity to the tasks than those with no OSA, and those <65 years with mild, moderate and severe OSA had a smaller increase in HF-HRV during recovery than those without OSA (p-interaction=NS) (**Table 1B**).

**Conclusions:** Our results showed reduced HRV...
at baseline and a decrease of the parasympathetic cardiac modulation with stress challenge associated with OSA severity. Findings were different according to age groups. Assessment of HRV may help identify individuals with OSA-related physiological abnormality.


Funding: No

Funding Component:

P274

Association Between Atrial Fibrillation and Central Sleep Apnea in Older Japanese-American Men

Tagayasu Anzai, Andrew Grandinetti, Alan Katz, Univ of Hawaii at Manoa Office of Public Health Studies, Honolulu, HI; Kamal Masaki, Univ of Hawaii at the John A. Burns Sch of Med and Kuakini Medical Ctr, Honolulu, HI

Introduction: Several studies have indicated that central sleep apnea (CSA) is associated with atrial fibrillation (AF) in older populations. However, there are few studies of this association in older Asian populations.

Hypothesis: The hypothesis being tested is that there is an association between AF and CSA in older Japanese-American men.

Methods: The Kuakini Honolulu-Asia Aging Study is a longitudinal cohort study of Japanese-American men living in Hawaii. We did a cross-sectional analysis using data from the 1999–2000 7th exam cycle. Participants were 718 Japanese-American men between 79 and 97 years old, who had overnight polysomnography (PSG) conducted in their homes using criteria established by the large multicenter Sleep Heart Health Study. Obstructive Apnea-Hypopnea Index (OAHI) was the number of the measure of obstructive apneas and hypopneas with >4% oxygen desaturation. Additionally, the Central Apnea Index (CAI) was the measure of number of central apneas. Obstructive sleep apnea (OSA) was categorized as none (OAHI <5), mild (OAHI 5-14), moderate (OAHI 15-29) and severe (OAHI 30 or more). CSA was defined by CAI of 5 or more. Cheyne-Stokes Breathing (CSB) was defined as a minimum consecutive 10-minute period of a crescendo-decrescendo respiratory pattern associated with CSA. A board-certified physician confirmed AF by single lead electrocardiography of PSG.

Results: The mean age of participants was 83.2±0.2 years. The prevalence of AF was 5.5% (39 of 709). The prevalence proportions of severe OSA, CSA, and CSB were 20.5% (145 of 709), 6.3% (43 of 681) and 3.2% (22 of 681) respectively. In multivariable-adjusted logistic regression models, CSA and CSB were significantly associated with AF prevalence [Odds Ratio (OR) 4.78; 95% Confidential interval (CI), 1.91-11.95] and [OR 5.48; 95% CI, 1.70-17.66], respectively. In contrast, OSA was not significantly associated with AF prevalence (severe OSA [OR 1.17; 95% CI, 0.44-3.11], moderate OSA [OR 0.72; 95% CI, 0.26-2.05], mild OSA [OR 0.97; 95% CI, 0.39-2.44]).

Conclusion: There is an association of AF prevalence with CSA and CSB in older Japanese-American Men. In older Japanese men, screening for CSA and CSB might be important to prevent AF.

Objective Short Sleep Duration Increases the Risk of Cancer Mortality Associated With Cardiovascular and Cerebrovascular Disease

Julio Fernandez-Mendoza, Fan He, Alexandros N Vgontzas, Duanping Liao, Edward O Bixler, Penn State Coll of Med, Hershey, PA

Introduction: Cardiovascular/cerebrovascular diseases (CBVD) and cancer share cardiometabolic risk factors (CMR) and underlying immune-related pathophysiologic mechanisms. Short sleep duration is a risk factor for CBVD, while the latter a predictor of cancer mortality. However, the role of sleep duration in predicting cancer mortality in the context of CBVD has not been systematically examined. Hypothesis: We hypothesized that objective sleep duration is an effect modifier of the impact of CMR and CBVD on cancer mortality. Methods: We addressed this question in the Penn State Adult Cohort, a random, general population sample of 1,654 men and women (47.5 ± 12.3 years) who were studied in the sleep laboratory with 8-hour polysomnography (PSG) at baseline and followed-up for 19.2 ± 5.2 years for cause of death. A total of 512 (30.9%) of subjects died during the follow-up, of whom 131 died of cancer. At baseline, the presence of CBVD was defined by a clinical history of heart disease and/or stroke, while the presence of CMR as stage 2 hypertension (blood pressure ≥140/90mmHg or anti-hypertensive medication) and/or type 2 diabetes (fasting glucose ≥126 mg/dL or treatment for diabetes). PSG-measured short sleep duration was defined as ≤ 6 hours of sleep at baseline. Results: We tested the interaction between CMR/CBVD and PSG sleep duration on mortality using Cox proportional hazard models controlling for multiple potential confounders (p-value=.05).

Consistent with this significant effect modification, the hazard ratios (95%CI) of cancer mortality associated with CMR and CBVD were 0.98 (0.54-1.79) and 0.55 (0.18-1.64) among individuals who slept ≥ 6 hours and 2.53 (1.23-5.22) and 2.92 (1.28-6.65) among individuals who slept < 6 hours. Conclusions: The risk of cancer mortality is significantly increased in adults with CMR or CBVD when they demonstrate objective short sleep duration. Future studies should disentangle the underlying mechanisms (e.g., immune suppression and chronic low-grade inflammation) of the association between short sleep and cancer incidence and mortality in individuals with or at-risk of CBVD.


Funding: Yes

Funding Component: National Center

Subjective versus Objective Measures of Sleep: Results From an Ecological Momentary Assessment Study

Christopher C Imes, Christopher E Kline, Dara D. Mendez, Ran Sun, Yu Yang, Eileen R Chasens, Univ of Pittsburgh, Pittsburgh, PA; Stephen L Rathbun, Univ of Georgia, Athens, GA; Lora E Burke, Univ of Pittsburgh, Pittsburgh, PA

Introduction: Reliable and valid measures are essential in research; however, it remains unclear if self-reported sleep measures are concordant with objective measures. Purpose: To examine the associations between subjective and objective sleep duration and awakenings among adults enrolled in a behavioral weight loss study. Methods: Self-report data included responses to the questions “How many hours of sleep did you get?” and “Number of awakenings?”
collected each morning by ecological momentary assessment. Objective measures included actigraphic data on sleep duration and awakenings collected for 7 days at 6 and 12 mos. Concordance between measures was examined using linear mixed models predicting self-report measures of sleep from objectively measured sleep.

Results: The sample (N = 137) was 89.8% female and 81.8% white with a mean age of 51.5 ± 9.9 yrs. Based on self-report, sleep duration was 417.2 ± 77.7 min./night with 1.7 ± 1.5 awakenings. Based on actigraphy, sleep duration was 413.1 ± 79.5 min./night with 33.0 ± 14.1 awakenings. The fitted model for sleep duration yielded an estimated intercept of 197.3 min. (95% CI, 178.0, 216.6) and slope of 0.54 (95% CI, 0.49, 0.58). In the scatter plot of self-report against objective sleep (Fig 1a), the plotted points were well-scattered about the 45-degree line suggesting that self-report min. of sleep predicted objective min. of sleep. The fitted model for awakenings yielded an estimated intercept of 0.95 awakenings (95% CI, 0.66, 1.2) and slope of 0.02 (95% CI, 0.015, 0.028). In the scatter plot of self-report against objective awakenings (Fig 1b), all of the plotted points fell below the 45-degree line indicating that self-report drastically underestimated actigraphic awakenings.

Conclusion: Self-reported sleep duration was a good indicator of objective sleep duration, while self-reported awakenings significantly underestimated actigraphic awakenings. Sleep is multi-dimensional and both subjective and objective measures are needed to capture its various features.


Funding: No

Funding Component:

P277

Short Sleep Duration is Associated With Greater Arterial Stiffness Independent of Sleep Quality

Christopher E Kline, Christy Taylor, Andrea M Kriska, Emma Barinas-Mitchell, Univ of Pittsburgh, Pittsburgh, PA

Introduction: Sleep duration is commonly associated with cardiovascular disease risk. Surprisingly, though, relatively few studies have examined the association between sleep duration and arterial stiffness, an early marker of cardiovascular risk. The available evidence remains equivocal, and few studies have examined whether sleep quality confounds the association between sleep duration and arterial stiffness. Purpose: The purpose of these analyses was to examine the association between sleep duration, sleep quality, and arterial stiffness in a sample of young- and middle-aged adults. Methods: The present analyses utilized baseline data from a sample of adults enrolled in a lifestyle intervention (N=324; 37.8±6.2 y, body mass index [BMI]: 32.8±3.9 kg/m², resting systolic blood pressure [SBP]: 113.5±10.4 mmHg, 77.2% female, 80.6% white). Sleep was assessed with the Pittsburgh Sleep Quality Index (PSQI); sleep duration and sleep quality were each assessed with single PSQI items; duration was classified into three categories (< 6 h, ≥ 6 to < 7 h, ≥ 7 h) and quality was dichotomized into good (very good/fairly good) and poor (very bad/fairly bad). Risk for sleep apnea was assessed with the Berlin Questionnaire. Arterial stiffness was assessed with carotid-femoral pulse wave velocity; values were log-transformed prior to analysis. Analysis of covariance models were used to examine the...
associations between sleep duration and quality with arterial stiffness. All models adjusted for age, sex, race, BMI, SBP, and sleep apnea risk. 

**Results:** Approximately 13%, 34%, and 53% of participants reported < 6 h, ≥ 6 but < 7 h, or ≥ 7 h sleep duration, respectively; 18% of participants reported poor sleep quality. 

Arterial stiffness significantly differed across categories of sleep duration ($\eta^2_p=.02; P=.03$); adults reporting < 6 h sleep duration had significantly greater arterial stiffness than adults reporting either ≥ 6 but < 7 h ($P=.02$) or ≥ 7 h ($P=.01$). In contrast, arterial stiffness did not differ according to sleep quality ($\eta^2_p=.00; P=.75$). When included in the same model, sleep duration remained a significant predictor of arterial stiffness ($\eta^2_p=.02; P=.03$), while sleep quality remained nonsignificant ($\eta^2_p=.00; P=.66$). 

**Conclusion:** In a sample of young- to middle-aged adults with overweight or obesity, short sleep duration was associated with greater arterial stiffness independently of sleep quality. Whether increasing sleep duration can improve arterial stiffness deserves further exploration.

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P278

**Patterns of Eating Associated With Sleep Duration, Insomnia, Daytime Sleepiness, and Overall Sleep Quality Among Individuals of Mexican Descent at the US-Mexico Border**

**Michael Grandner,** Ashley Okuagu, Karla Granados, Kayla Olivier, Pamela Alfonso-Miller, Univ of Arizona, Tucson, AZ

**INTRODUCTION:** Previous studies have linked sleep to risk of diabetes and obesity, at least partially via alterations in food intake. Diabetes and obesity are common among Hispanics/Latinos, and studies are needed to better clarify the role of sleep in health among this group. 

**METHODS:** Data were collected from N=100 adults (age 18-60, 53% female) of Mexican descent in the city of Nogales, AZ (66% not born in the US, 33% 1st-generation). Surveys were presented in English or Spanish. Eating Patterns were assessed with the 3-Factor Eating Questionnaire (3FEQ), which resulted in a total score and subscales for “cognitive restraint,” “uncontrolled eating,” and “emotional eating.” Insomnia was assessed with the Insomnia Severity Index (ISI), Sleepiness with the Epworth Sleepiness Scale (ESS), Sleep quality with the Pittsburgh Sleep Quality Index (PSQI), and weekday and weekend sleep duration with the Sleep Timing Questionnaire (STQ). Covariates included age, sex, and immigrant status. 

**RESULTS:** See Table. Eating patterns associated with insomnia, sleep quality, sleepiness, and weekend (but not weekday) sleep duration. Regarding subscale scores, relationships were generally seen between sleep and emotional eating and unrestricted eating, and not cognitive restraint. 

**CONCLUSIONS:** Several different aspects of sleep quality were associated with eating patterns at the US-Mexico border, particularly in the area of unrestricted eating and emotional eating. This suggests possible mechanisms linking sleep and obesity in Hispanics/Latinos.
Marijuana Use, Multiple Sleep Characteristics, and Hypertension Among White, Black, and Hispanic Adults in the United States

Symielle A Gaston, Chandra L. Jackson, NIEHS, Research Triangle Park, NC

Introduction: Prior studies have found an association between marijuana use and hypertension. However, few consider the role of sleep as an explanatory factor or race/ethnicity as a moderator. Our objective was to investigate associations between marijuana use, sleep characteristics, and hypertension in a multiethnic population.

Hypothesis: We hypothesized that the marijuana use and sleep association would vary by race/ethnicity and sleep would partially explain associations between marijuana use and hypertension. Methods: We used National Comorbidity Survey-Replication cross-sectional data (2001-2003) from white, black, and Hispanic participants aged ≥18 years who reported no current abuse of cocaine or prescription drugs. Participants self-reported marijuana use, multiple sleep characteristics (insomnia symptoms, early awakening, daytime sleepiness), and a physician’s diagnosis of hypertension (yes vs. no). Using Poisson regression with robust variance and sampling weights, we estimated the prevalence of poor sleep characteristics among participants who reported current or former use to never use adjusting for age, sex, and race/ethnicity. Sleep characteristics were added to adjusted models for associations between use and hypertension. Race/ethnicity*marijuana use interaction terms were tested for all models. Results: Among 3,928 participants, mean age±SE was 45±0.49 years, 79% were white, 11% black, and 10% Hispanic. Current users were younger (32±0.49 years), more likely to report black (17%) or Hispanic (13%) race/ethnicity and insomnia symptoms (31%), and less likely to report hypertension (12%) compared to former (40.6±0.45 years, 9.6% black, 9.9% Hispanic) and never (51.1±0.79 years, 10% black, 9.9% Hispanic) users. Estimates were similar across marijuana use categories for early awakening (16%) and daytime sleepiness (34%). Former marijuana use was associated with 22% (whites) to 38% (blacks) and 33% (Hispanics) to 85% (blacks, prevalence ratio (PR)=1.85 [95% confidence interval: 1.06-3.23]) higher prevalence of insomnia symptoms as well as 32% (blacks) to 49% (whites) and 46% (blacks) to 77% (whites, PR=1.77 [1.29-2.44]) higher prevalence of early awakening (p<0.05). Across all races/ethnicities, marijuana use was similarly associated with higher prevalence of daytime sleepiness (PR_current=1.20 [1.00-1.43]). Former marijuana use was associated with higher prevalence of
hypertension only among blacks (PR=1.46 [1.04-2.05]) and sleep characteristics explained approximately 2% of this association on average. Conclusions: Marijuana use was associated with poor sleep and relationships varied by race/ethnicity, but relationships between marijuana use and hypertension were not explained by sleep.

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P280

The Association of Sleep Apnea with Psychiatric History: A Veteran Twin Study

Minxuan Huang, Donald L Bliwise, Amit J Shah, Emory Univ, Atlanta, GA; Jack H Goldberg, Univ of Washington, Seattle, WA; Yi-An Ko, Nancy Murrah, Oleksiy M Levantsevych, Lucy H Shallenberger, J. Douglas Bremner, Viola Vaccarino, Emory Univ, Atlanta, GA

Introduction: Sleep apnea is exceedingly common in elderly men and is associated with higher risk of cardiovascular disease. Post-traumatic stress disorder (PTSD) and depression have been shown to be associated with sleep apnea, however results have not been consistent, and it is unclear whether this association is confounded by cardiovascular and behavioral risk factors. In this study, our objective was to explore the risk factors for sleep apnea with a focus on psychiatric history, and we hypothesized that the association of sleep apnea with psychiatric history can be largely influenced by cardiovascular and behavioral factors. Methods: This was a cross-sectional analysis of 100 members of the Vietnam Era Twin (VET) Registry (50 twin pairs, mean age=68; range: 61-71 years). All twins underwent a one night in-lab polysomnography (PSG) to assess the apnea/hypopnea index (AHI). Clinical diagnoses of lifetime history of major depression and PTSD were obtained with the Structured Clinical Interview for DSM V (SCID); we also measured current depressive symptoms with the Beck Depression Inventory-II (BDI-II). To assess associations of study variables with AHI, within-pair differences in multivariable mixed-effects regression models were examined and β coefficients were calculated. In addition to lifetime history of depression and PTSD, we included in the model the following variables previously reported in the literature to be associated with AHI: body mass index (BMI), current smoking, history of alcohol abuse, and physical activity assessed with the Baecke score. Other variables included years of education, sedative/hypnotic use, and antidepressant use. Results: The mean AHI among these men was 15.5 [SD=16.1]. A total of 18 and 28 twins had diagnoses of lifetime history of depression and PTSD, respectively. In bivariate analysis without adjustment for covariates, psychiatric history (depression or PTSD) was not significantly associated with higher AHI. In mixed-effects multivariable regression analysis, only higher BMI (β=2.3, 95% CI=1.5, 3.1) and less education (β=-1.3, 95% CI=-2.4, -0.1) were independently associated with higher AHI. Psychiatric history of depression (β=3.9, 95% CI=-3.5, 11.3) or PTSD (β=6.0, 95% CI=-0.9, 12.9) were not significantly associated with AHI. Additional analyses examining number of depressive symptoms (BDI-II) showed similar results. Conclusion: As expected, higher BMI was associated with higher AHI, but several other variables thought to be associated with higher AHI were not confirmed, such as smoking status, alcohol abuse, sedative/hypnotic use, and lack of physical activity. In contrast to the prevailing literature, neither lifetime history of depression nor PTSD were associated with sleep apnea. However, the role for poor sleep quality other than sleep-disordered breathing still remains to be investigated.

Psychosocial Factors Are Strongly Associated With Sleep Disturbances and Evening Chronotype Among Diverse Women: Evidence From the AHA Go Red for Women Strategically Focused Research Network

Brooke Aggarwal, Nour Makarem, Ming Liao, Zara Mayat, Stephanie Byun, Elsa-Grace Giardina, Columbia Univ Medical Ctr, New York, NY

BACKGROUND: Psychosocial factors have been linked to increased CVD risk through biological and behavioral mechanisms, possibly including short and/or long sleep duration. However, relations between specific aspects of sleep, chronotype, and psychosocial factors have not been fully characterized, particularly among women, who are more prone to poor sleep and psychosocial distress.

HYPOTHESIS: Depression, low social support, and caregiver responsibilities and strain will be associated with poor sleep patterns and having an evening chronotype among free-living ethnically diverse women.

METHODS: Women ages 20-76 y participating in the AHA Go Red for Women SFRN were included (N=506, 61% racial/ethnic minority, mean age = 37 ±16y). Assessments included: 1) sleep duration and quality, [Pittsburgh Sleep Quality Index (PSQI)]; 2) presence of insomnia, [Insomnia Severity Index (ISI)]; 3) obstructive sleep apnea (OSA) [Berlin Questionnaire], and 4) chronotype [Morningness-Eveningness Questionnaire]. Depression was assessed using the Beck Depression Inventory-II, low social support using the ENRICHD Social Support Instrument, and caregiver strain using the Caregiver Strain Index. Logistic regression models were used to evaluate cross-sectional associations between psychosocial factors and sleep, adjusted for age, race, ethnicity, education, and insurance.

RESULTS: Nearly 1 in 5 participants had depressive symptoms, 27% had low social support, 21% were caregivers, and 29% of caregivers experienced high strain. Half of women had short sleep duration (<7h/night), 39% had poor quality sleep (PSQI score >5), and 38% had some level of insomnia (ISI score ≥8). After adjusting for confounders, women who were depressed had ~3-fold higher odds of short sleep (<7h/night), 2-fold higher odds of poor sleep quality and having a high OSA risk (95%CI=1.69-4.61, 1.42-3.70, and 1.34-4.24, respectively), and 4-fold higher odds of insomnia (95%CI=2.42-6.59). Women with depressive symptoms were more likely to have an evening vs morning or intermediate chronotype (OR: 2.62, 95%CI=1.41-4.89). Low social support was associated with insomnia (OR: 1.79, 95%CI=1.18-2.71) and evening chronotype (OR: 2.38, 95%CI=1.35-4.19). Being a primary caregiver was associated with sleeping <7h/night (OR: 1.73, 95%CI=1.09-2.77) and high risk for OSA (OR: 2.46, 95%CI=1.43-4.22). There was no association between depression and long sleep (>8 h/night).

CONCLUSIONS: In this diverse sample of women, sleep problems were highly prevalent and associated with psychosocial risk factors for CVD including depression, low social support, and caregiving. Low social support and depression were also associated with evening chronotype. These findings suggest that sleep may be a potential mechanism linking psychosocial factors to CVD risk but associations may be bidirectional and warrant confirmation prospectively.


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Sub-Optimal Sleep Duration is Independently Associated With Morbid Obesity in the United States

Ehimen Aneni, Javier Valero-Elizondo, Yale Univ Sch of Med, New Haven, CT; Chukwuemeka U Osondu, Baptist Health South Florida, Miami, FL; Eric J Brandt, Khurram Nasir, Yale Univ Sch of Med, New Haven, CT

INTRODUCTION: Extremes of sleep duration and morbid obesity are independent risk factors for cardiovascular disease (CVD). There are only a few studies that have examined the relationship between the two and even less have studied their association in a national cohort. METHODS: We utilized the National Health Interview Survey (2013-2017) for this study. We assessed the cross-sectional association between habitual self-reported sleep duration (in hours) and obesity groups. We also conducted subgroup analysis to show the trends in sleep duration among subgroups with morbid obesity (BMI ≥35kg/m²). RESULTS: After exclusion of 1,897 persons who reported sleeping more than 12 hours in a day, there were 154,872 participants in the study representing a population of 227.9 million US adults annually. The prevalence of moderate (BMI 35 -39.9kg/m²) and severe obesity (BMI ≥40kg/m²) was 7.1% and 8.1% respectively. The prevalence of morbid obesity was highest among blacks, females and persons aged 40 - 64 years (21.5%, 17.5% and 17.3% respectively). There was a U-shaped distribution in the prevalence of moderate and severe obesity with increase in sleep duration. The lowest prevalence was seen among persons who slept 7-<9hours. Females, blacks and persons aged 40 - 64years had a higher prevalence of severe obesity at every subgroup of sleep duration. Across sleep duration, Asians and Hispanics demonstrated a clear U-shaped trend for severe, but not moderate obesity. In multivariate analysis controlling for demographics, CVD risk factors and comorbidities, sleeping less than 7 hours was independently associated with moderate and severe obesity, while sleeping 9 or more hours was associated with severe obesity. The above findings are depicted in attached figure.

CONCLUSION: Compared to 7-<9 hours of sleep, shorter and longer (sub-optimal) sleep duration, was independently associated with morbid obesity. The relationship between sleep and morbid obesity differs by race and requires further exploration.


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Introduction: Cardiovascular death is the leading cause of mortality in patients on hemodialysis. Traditional risk factors such as diabetes and hypertension do not fully account for this excess risk. Toxic metabolites that accumulate in renal failure may be responsible for accelerated cardiovascular disease, but these metabolites remain undefined.

Hypothesis: The goal of this pilot study was to determine if an untargeted metabolomic approach could identify metabolites associated with cardiac death in dialysis patients.

Methods: In this matched case-control study nested in the HEMO study, cases experienced cardiac death vs. were alive, respectively, at 12 months after enrollment. Cases and controls were matched on sex, race, diabetes, cardiac disease, age, and albumin. Cardiac death included death from ischemic heart disease, heart failure, and arrhythmias. Serum samples frozen at the 4 month visit were profiled by mass spectrometry. Conditional logistic regression assessed each metabolite’s association with cardiac death.

Results: A total of 47 cases and 47 controls were studied. 777 metabolites available for analysis after data preprocessing. At the p<0.005 threshold, several metabolites were positively associated with cardiac death, and several metabolites were negatively associated with cardiac death. However, no metabolite had significant associations using false discovery rate thresholds.

Conclusions: Our study is an example of the use of metabolomics as a strategy for identification of metabolites that may explain the high risk of cardiac death in patients undergoing hemodialysis.

Figure 1: Odds ratio for 1-year risk of cardiac death per doubling of metabolite level for each metabolite in the HEMO Study


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P284

The Chemotherapeutic Agent Docetaxel Disrupts Mitochondrial Energetics in 3D Human Bioengineered Myobundles

Maria J. Torres Alcalde, Duke Molecular Physiology Inst, Duke Univ, Durham, NC; Xu Zang, Dept of Biomedical Engineering, Duke Univ, Durham, NC; Dorothy H. Slentz, Timothy R Koves, Duke Molecular Physiology Inst, Duke Univ, Durham, NC; George A Truskey, Dept of Biomedical Engineering, Duke Univ, Durham, NC; Deborah M Muoio, Duke Molecular Physiology Inst, Duke Univ, Durham, NC

Taxanes (i.e. docetaxel, (TAX)) comprise the first line-treatment for breast cancer (BC), mostly in combination with anthracyclines like doxorubicin (DOX). The efficacy of these drugs as antineoplastic agents has helped to boost 10-year survival rates to > 90%, leading to a fast-growing population of over 3 million BC survivors in the US. However, epidemiological evidence shows that the highly abrasive nature of these therapies can give rise to a vicious cycle of metabolic decline and physical inactivity that compromises quality of life and increases risk of numerous musculoskeletal and cardio-metabolic disorders including arthritis,
sarcopenic obesity, cardiovascular disease and type 2 diabetes. Major side effects of TAX include peripheral neuropathy, arthralgia, myalgia and muscle weakness. Taxanes act primarily by stabilizing microtubules (MTs), which causes cell cycle arrest. Importantly, MT dynamics can also impact mitochondrial function. For example, the MT protein unit, tubulin, can bind to the outer mitochondrial protein channel, VDAC, and thereby affect ATP transport to the cytosol. Herein, we sought to test the hypothesis that TAX exacerbates DOX-induced mitochondrial dysfunction, which is thought to underlie anthracyclines’ cardiotoxicity. To this end, we leveraged a newly developed 3-D bioengineered model of human muscle organoids (myobundles), derived from primary human skeletal muscle progenitor cells (HSkM), to study mechanisms of TAX-induced myotoxicity and its interactions with DOX. Preliminary findings in primary HSkM cells exposed to 3 daily x 3 h treatments with TAX (1-100 nM) +/-10 nM DOX caused a robust ~10-fold acetylation of α-tubulin at lysine 40 (AcK40), reflecting marked stabilization of MTs. TAX treatment decreased basal and ATP-linked respiration (J02) up to 30% (p<0.05), in a dose-dependent manner. However, maximal uncoupled J02 (+FCCP) remained unchanged, suggesting TAX disrupts mitochondrial thermodynamics and energy transfer, rather than maximal oxidative phosphorylation capacity. Exposure of 3D myobundles to a TAX+/DOX regimen that mimicked human pharmacokinetics post-infusion led to a 30-fold increase (p<0.005) in AcK40 α-tubulin. TAX alone induced a biphasic J02 response to ADP (KMDP 2- and 4-fold higher, p<0.05), but when combined with DOX there was a 50% loss in maximal J02 (p<0.005) with no changes in KMDP. We hypothesize that the TAX-driven stabilization of MTs leads to detrimental MT-mitochondria interactions that disrupt ATP/ADP transfer between cellular compartments, exacerbating DOX toxicity and ultimately impairing muscle function. The present findings provide novel insights into the mechanisms of TAX-induced myotoxicities, which is of paramount importance for developing therapeutic strategies to improve cardiovascular health and quality of life of long-term breast cancer survivors.


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P285

Development of a Simplified Method for the Measurement of Plasma Alkylresorcinols as a Biomarker of Whole Grain Intake and Application to a Human Clinical Trial Evaluating the Effect of Carbohydrate Quality on Cardiometabolic Risk Factors

Jose Rodriguez-Morató, Univ Pompeu Fabra, Barcelona, Spain; Sarah Jayawardene, Gregory Dolnikowski, Jean Galluccio, Alice H Lichtenstein, Nirupa R Matthan, Jean Mayer USDA HNRCA at Tufts Univ, Boston, MA

Introduction: Consumption of whole grains is associated with improvements in cardiometabolic risk factors and decreased CVD risk. Quantification of whole grain intake is challenging due to the limitations of self-reported intake; diversity among and differences in the interpretation of the term “whole grain”. Alkylresorcinols (ARs) are phenolic lipids present in the outer layer of wheat and rye grains that are considered objective biomarkers of whole grain intake. Current methods for ARs quantification involve a multi-step separation, extraction and purification processes that hampers applicability in large-scale studies. Hypothesis: Our aim was to develop a single-step method to measure 5 predominant ARs (C17:0, C19:0, C21:0, C23:0 and C25:0) in human plasma, and to validate this method by measuring plasma ARs levels in subjects who participated in a...
randomized, cross-over trial evaluating the effect of carbohydrate quality on CVD risk factors. We hypothesized that the direct method would distinguish between low- and high-whole grain intake and be more rapid and cost effective than prior methods. **Methods:** A dilute-and-shoot strategy based on plasma (20 µL) dilution with methanol for protein precipitation, followed by centrifugation and direct injection into an ultra-high performance liquid chromatography-quadrupole time-of-flight mass spectrometer (UHPLC/Q-TOF-MS; Agilent Technologies), using negative electrospray ionization. C19:0-D₃ was used as internal standard. Separation was performed using a C18 column. Run time was 11 minutes/sample. Method validation was based on the following criteria: linearity, working range, lowest limit of quantification (LOQ), accuracy and precision. This method was then used to quantify ARs in fasting plasma samples from postmenopausal women and men (N=11, 65±8 years, BMI 29.8±3.2 kg/m², LDL-C ≥2.6 mmol/L) who consumed each of 3 isocaloric diets (60%E carbohydrate, 15%E protein, 25%E fat) enriched in either simple, refined, or unrefined carbohydrate-containing foods for 4.5 weeks in a randomized crossover design, with 2-week washout periods. **Results:** (1) Analytical: The method showed linearity (>0.999) in the range 2 to 100 ng/mL, and had acceptable values for accuracy and precision with a LOQ of 2 ng/mL. (2) Applicability: Total fiber content of the simple, refined and unrefined carbohydrate diets was 8.6, 9.6 and 19.5g/1000kcal, respectively. This was reflected in plasma AR levels, being significantly higher (p<0.05) after subjects consumed the unrefined (124.8±55.8 pmol/mL) compared to the simple (29.5±10.3 pmol/mL) and refined (26.8±9.0 pmol/mL) diets. C21:0 and C19:0 were the major ARs present in plasma. **Conclusion:** This simplified method offers a direct and rapid strategy to accurately measure AR in human plasma that can be scaled up for large studies, and provides an objective assessment of whole grain intake.


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P286

**Short-Term Repeatability of Electrocardiographic Criteria of Left Ventricular Hypertrophy**

Michelle L Meyer, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Elsayed Z Soliman, Wake Forest Univ, Winston Salem, NC; Dominique Drager, Gerardo Heiss, Univ of North Carolina at Chapel Hill, Chapel Hill, NC

**Background:** Left ventricular hypertrophy (LVH) is a marker of cardiac end-organ damage and a risk factor for cardiovascular morbidity and mortality. Although electrocardiogram (ECG) is the most common tool for LVH assessment in contemporary clinical trials and cohort studies, the repeatability of ECG-LVH criteria has not been sufficiently examined.

**Objectives:** Characterize the repeatability and minimal detectable change of ECG-LVH criteria.

**Methods:** A total of 63 participants (mean age 50 years; 31 females) underwent two visits one week apart. At each visit, two digital ECGs were obtained following a standardized protocol. The ECG data were processed centrally to automatically obtain waveform measurements needed to calculate Cornell voltage (CV) LVH (SV3 + RaVL >2800 µV for men and >2000 µV for women), Cornell voltage product (CVP) LVH ((RaVL + SV3) X QRS duration ≥244 mV sec; for both Cornell criteria, 0.8 mV was added to the voltage sum for women), and Sokolow-Lyon (SL) LVH (SV1 +RV5/V6 ≥3500 µV). In addition to using these criteria as dichotomous LVH variables, we also used the waveforms measurements composing them as continuous variables, referred to here as CV-index, CVP-
index, and SL-index. We used random-effects, mixed models to parse the variance of the variables into their between-participant, between-visit, and within-visit components, and calculated the intra-class correlation coefficient (ICC), minimal detectable change (95% confidence), and Kappas.

**Results:** Between-participant variation accounted for 93% to 97% of the total variation in CV-index, CVP-index, and log of SL-index. The ICCs (95% confidence intervals) were 0.97 (0.96, 0.98) for CV-index, 0.97 (0.95, 0.98) for CVP-index, and 0.93 (0.90, 0.96) for log of SL-index.

Minimal detectable change between repeat measures of CV-index, CVP-index, and log of SL-index were ≥236.7 μV, ≥26.7 mV, and ≥0.09 μV, respectively. The within-visit Kappa (95% confidence limits) was 0.73 (0.38, 1.00) for SL LVH and 1 for the other two LVH criteria. The between-visit Kappa was 1 for CV LVH, 0.66 (0.04, 1.00) for CVP LVH, and 0.40 (-0.03, 0.83) and 0.64 (0.26, 1.00) for the SL LVH first and second measurements of each visit, respectively. When defining ECG-LVH as presence of ≥1 ECG-LVH criteria, the within visit Kappa became 0.78 (0.49, 1.00) for the first visit and 1 for the second visit; the between visit Kappa values became 0.50 (0.12, 0.88) and 0.70 (0.38, 1.00) for the first and second measurements of each visit.

**Conclusion:** CV, CVP, SL indices as continuous variables have excellent repeatability. The dichotomous ECG-LVH criteria have excellent within visit agreement, but between visit agreement ranges from fair to poor, which improved by combining multiple criteria. These results alleviate concerns about the repeatability the ECG LVH use in clinical trials and epidemiologic studies.

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**Hypocholesterolemic Effect of Dietary Stearic Acid May Be Partly Mediated via Alterations in Fecal Bile Acid Metabolism**

**Nirupa R Matthan,** Jean Mayer USDA HNRCA at Tufts Univ, Boston, MA; Jose Rodríguez-Morató, Univ Pompeu Fabra, Barcelona, Spain; Huicui Meng, Sch of Public Health (Shenzhen), Sun Yatsen Univ, Guangzhou, Guangdong Province, China; Rebecca Cohen, Jean Galluccio, Gregory Dolnikowski, Alice H Lichtenstein, Jean Mayer USDA HNRCA at Tufts Univ, Boston, MA

**Introduction:** Dietary fat quality has a significant impact on CVD risk. Among the saturated fatty acids (FA), we and others have documented that stearic (18:0) is unique because, unlike shorter chain FA (12:0, 14:0, 16:0), it does not raise plasma LDL-C levels, relative to monounsaturated FA, such as oleic acid (18:1). The mechanism(s) responsible for this effect are not fully elucidated. **Hypothesis:** We tested the hypothesis that the hypocholesterolemic effect of dietary 18:0 and 18:1 relative to 16:0 is mediated by alterations in fecal bile acid metabolism. **Methods:** Primary (cholic, chenodeoxycholic) and secondary bile acids (SBA: lithocholic [LA], deoxycholic [DCA]) were quantified in stool samples from a randomized controlled cross-over trial examining the effect of dietary FA on CVD risk factors. Subjects (N=20 postmenopausal women, 50-85 years, BMI 25-35kg/m², LDL-C >100mg/dL) consumed each diet for 35 days separated by a 2 week washout period. Diets provided 55%E carbohydrate, 15%E protein and 30%E fat with half of the fat provided by 16:0, 18:0 or 18:1, respectively. CVD risk factors (lipids, glucose, insulin, inflammatory markers) were measured using standard methodology. For fecal bile acids analysis, freeze dried samples were spiked with the corresponding deuterated internal standards, followed by an overnight extraction, purification and analysis using reversed-phase liquid chromatography coupled with electrospray ionization quadrupole time of flight mass spectrometry. Quantification was by isotopic dilution.
Spearman correlation coefficients were calculated between bile acids and CVD risk factors. **Results:** Fecal total SBA levels were significantly lower after subjects consumed the 18:0 (4.5±3.9 umol/g) compared to the 18:1 (6.8±5.7 umol/g) diet, with intermediate levels after the 16:0 diet (5.2±3.6 umol/g). This was predominantly due to significantly lower LA, and to a lesser extent DCA levels. No detectable differences were observed in primary bile acids levels. Total, LA and DCA levels were positively correlated with insulin (r=0.38 to 0.45; p<0.05), hsCRP (r=0.31 to 0.37, p<0.02), TG (r=0.46 to 0.60; p<0.001), VLDL-C (r=0.47 to 0.63; p<0.001), TC/LDL-C (r=0.42 to 0.63; p<0.001) and LDL-C/HDL-C (0.37 to 0.57; p<0.001) ratios, and negatively with HDL-C (r=-0.51 to -0.44; p<0.001) levels. LA levels were also positively correlated with LDL-C levels (r=0.33; p=0.011).

**Conclusion:** These data suggest that the hypocholesterolemic effect of dietary 18:0 was not mediated by increased bile acid excretion as was observed with dietary 18:1. Instead, dietary 18:0 appears to have an inhibitory effect on hydrophobic SBA synthesis in the intestine, which in turn could reduce the efficiency of cholesterol solubilization and thus cholesterol absorption. Further studies on the effects of dietary 18:0 on gut microbiome populations involved in SBA synthesis are warranted.

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**P288**

**The Effect of a Time Restricted Eating Approach vs. Standard Heart Healthy Dietary Counseling on Cardiometabolic Health Measures in Adults With Abdominal Obesity: A Randomized Pilot Trial**

**Introduction:** Basic and population level research suggest that meal timing and circadian rhythms are linked with cardiometabolic health. However, interventions that aim to optimally align meal timing with circadian rhythms have an unclear clinical impact on cardiometabolic risk; a critical gap since insight into the interplay between the noted factors may have important preventive and therapeutic implications. To begin addressing this gap, we carried out a randomized dietary intervention trial comparing a time restricted eating (TRE) intervention to standard dietary counseling (STD) for cardiometabolic health as recommended by the AHA and the Academy of Nutrition and Dietetics. **Hypothesis:** A STD dietary intervention will differentially improve measures of clinical cardiometabolic health compared to a TRE dietary intervention.

**Methods:** **Design:** Randomized parallel arm pilot trial with 1-week run in period and 8-week intervention period. **Participants:** 30 adults with abdominal obesity, free of major chronic disease, with interest in improving cardiometabolic health status via dietary counseling with a Registered Dietitian (RD). **Intervention:** All participants received 4 RD sessions, and were blinded to the nature of the other arm. **TRE-** RD counseling specifically on meal timing with no mention of content. Explicit directions for daily 12 hour TRE regimen representing the theoretical optimal conditions for cardiometabolic health to begin upon waking. **STD-** RD counseling specifically on content of dietary pattern with no mention of meal timing. **Measurements:** All clinical measures were collected by standardized protocol. Diet was assessed by random 24 hour recalls during the run-in (n=2), and intervention (n=3). Blinded continuous glucose monitors assessed adherence, and physical activity/sleep data were collected objectively by wearable device. **Analysis:** Standard intent-to-treat analyses utilizing ordinary least-squares linear...
regression models, adjusted for baseline measurements to compare participants across assignment groups. **Results:** 30 participants (26 women) were randomized, mean (SD) age 42 (13) years and 28 completed. The STD intervention reduced the triglyceride (TG):HDL ratio (2.7 to 2.5), LDL (mg/dL) (118 to 107), blood pressure (BP) (118/74 to 114/72), and increased dietary quality (HEI-2015 score, 57 to 63). The TRE intervention also reduced the (TG):HDL ratio (2.8 to 2.6), LDL (109 to 108), BP (123/78 to 119/74), and increased dietary quality (HEI-2015 score, 50 to 54). P < 0.05 comparing STD to TRE for LDL. **Conclusions:** Both interventions improved cardiometabolic health and diet quality suggesting a TRE approach may be a useful counseling approach for clinical cardiometabolic health. The STD arm appeared to have stronger effects for LDL compared to TRE, but only a larger and longer trial will provide a definitive answer for any measure.

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**P289**

**Effects of Dietary App-Supported Tele-Counseling on Sodium Intake, Diet Quality, and Blood Pressure in Patients With Diabetes and Kidney Disease**

**Background:** Despite the importance of healthy diet for cardiovascular (CVD) health, the vast majority of patients with chronic kidney disease (CKD) do not receive dietitian counseling or make dietary modifications. Evidence for using dietary apps and tele-counseling to improve CVD risk factors is limited. **Methods:** We examined the effects of dietary app-supported tele-counseling on sodium intake and diet quality in 44 patients with type 2 diabetes and stage 1-3a CKD. Patients recorded and shared dietary data via MyFitnessPal with registered dietitians, who used motivational interviewing to provide telephone counseling weekly for 8 weeks. Outcomes included 24-hour urine sodium (2 collections per timepoint), Healthy Eating Index (HEI) 2015 score (multiple 24-hour dietary recalls per timepoint), 24-hour systolic blood pressure (SBP), and 24-hour urine albumin excretion. We report interim results for patients who completed 8-week and 6-month data collection; final outcome data at 12 months will be completed in November 2018. **Results:** Out of 44 consented patients (mean age 60.3 ± 11.9 y, 43% female, 93% white, 20% <$25,000 annual income, 84% hypertension), 32 (73%) completed 8-week follow-up and 29 (66%) completed 6-month follow-up. While 78% owned a smartphone, 52% entered dietary data using a computer. Among patients who completed 6-month follow-up, sodium excretion did not significantly decrease from baseline to 8 weeks (-345 mg/d, 95% CI: -865, 175) or 6 months: (-182 mg/d, CI: -460, 97) (Table). However, HEI-2015 score improved by 3.19 (CI: 0.51-5.87) at 8 weeks and 7.21 (CI: 3.07, 11.3) at 6 months; 24-hour SBP improved by -3.7 (CI: -7.4, 0.1) at 8 weeks and by -4.9 (CI: -8.8, -0.9) at 6 months. **Conclusions:** An app-supported tele-counseling program with a registered dietitian appears to be a feasible strategy to improve dietary quality and blood pressure, even in patients with diabetes and early CKD. Sodium is ubiquitous in the food supply and hard to change at the individual level. Studies to demonstrate efficacy are needed.

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Funding Component: P290

Dietary and Serum Omega-6 and Omega-3 Fatty Acids Are Associated With Physical and Metabolic Dysfunction in Chronic Stroke Survivors

Monica Serra, Atlanta VAMC and Emory Univ, Decatur, GA; Charlene Hafer-Macko, Alice Ryan, Baltimore VAMC and Univ of Maryland Sch of Med, Baltimore, MD

Background: Higher dietary intake of omega-6/omega-3 ratios is associated with reduced physical functioning in older adults, but is not well documented in chronic stroke survivors.

Purpose: The purpose of this study was to quantify dietary intake of omega-6 and omega-3 fatty acids, their habitual dietary intake ratios and systemic omega-6/omega-3 profiles and to determine their relationship with physical and metabolic function in a cohort of chronic adult stroke survivors.  Methods: Twenty-five older chronic stroke survivors (age: 63±8 yrs; BMI: 31±7 kg/m²; mean±SD) were assessed for fitness (VO2peak) and six-minute walk distance (6MWD).  Plasma lipid and glucose profiles were measured and HOMA-IR calculated.  Dietary (5-day food records) and serum (mass spectrometry) omega-6/omega-3 profiles were assessed.  Results: Participants were severely deconditioned (VO2peak: 19±4 ml/kg/min; 6MWD: 295±121 m) and at elevated metabolic risk (HOMA-IR: 6.3±4.5).  The dietary intake ratio of omega-6/omega-3 fatty acids averaged 12.6±7.1 and the serum concentration ratio was 1.21±0.37, which were positively correlated (r=0.88, P<0.01).  Higher dietary intake and serum concentrations of omega-6/omega-3 fatty acids were associated with lower 6MWD (diet: r=-0.49; serum: r=-0.43) and higher HOMA-IR (diet: r=0.39; serum: r=0.34, while a higher serum omega-6/omega-3 concentration index was associated with lower VO2peak (r=-0.38) (all P<0.05).  Conclusion: These preliminary data suggest that both dietary omega 6 and omega 3 fatty acids (quantitated as their intake ratio) and the serum concentration ratio of omega-6/omega-3 may be important indices of physical dysfunction and insulin resistance in chronic stroke survivors.

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Racial/Ethnic Differences in the Shopping Behaviors and Fruit and Vegetable Consumption of Low-Income Farmers Market Incentive Program Users in Illinois

Chelsea Renee Singleton, Univ of Illinois at Urbana-Champaign, Champaign, IL; Nicollette Kessee, Univ of Illinois at Chico, Chicago, IL; Corey Chatman, Connie Spreen, Experimental Station, Chicago, IL

Introduction: Studies have shown that low-income populations in the US often consume fewer servings of fruits and vegetables (FVs) per day compared to higher income populations.  Farmers market incentive programs provide monetary incentives to Supplemental Nutrition Assistance Program (SNAP) participants to...
support their procurement of fresh FVs. Information on the racial/ethnic differences in FV consumption among SNAP participants who utilize farmers market incentive programs is scarce. This research aimed to address this need by examining racial/ethnic differences in the farmers market shopping behaviors and frequency of FV consumption among users of the Link Match program in Illinois. We hypothesized that Non-Hispanic Black program users will consume FVs less frequently than Non-Hispanic White users. **Methods:** A cross-sectional evaluation of 328 Link Match users (39.6% Non-Hispanic White; 45.4% Non-Hispanic Black; and 15.0% Other) was conducted during the 2016 and 2017 farmers market seasons in Illinois. Information on user demographics, farmers market shopping behaviors, and frequency of FV consumption in the prior month was collected. Chi-square and ANOVA tests were used to assess racial/ethnic differences in farmers market shopping behaviors. Multivariable-adjusted logistic regression models were used to examine the association between race/ethnicity and daily consumption of FVs among program users. **Results:** A significantly higher percentage of Non-Hispanic Black Link Match users reported being an infrequent farmers market user (i.e., shopping ≤ once a month) compared to Non-Hispanic White and Other users (p = 0.01). After adjusting for covariates (i.e., demographics, market location), Non-Hispanic Black users had lower odds of consuming fruit daily (OR: 0.44; 95% CI: 0.22-0.86) compared to Non-Hispanic White users. Other users had lower odds of consuming vegetables daily (OR: 0.30; 95% CI: 0.12-0.71) compared to Non-Hispanic White users. **Conclusions:** Significant racial/ethnic differences in shopping behaviors and FV consumption were observed among Link Match users in Illinois. Future research should examine the nutritional and health implications of these differences.

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**P292**

**Almond Consumption Increases Satiety Hormones Relative to a High-Carbohydrate Food but Has Minimal Impact on Body Composition: A Pilot Study in Black and Hispanic Adults**

Ayanna Campbell, Columbia Univ, New York, NY; Arindam RoyChoudhury, Cornell Univ, New York, NY; **Marie-Pierre St-Onge**, Columbia Univ, New York, NY

Epidemiological studies show that nut consumers have lower body weight than non-consumers. Individuals who consume more tree nuts have lower odds of obesity and metabolic syndrome than those who are low tree nut consumers. In clinical intervention studies, nut consumption has been shown to lower abdominal adiposity and improving weight loss relative to a low-fat/high-carbohydrate (LF/HC) control food. Those studies, however, have been conducted predominantly in White, non-Hispanic populations. Interestingly, minority adults, who have the highest prevalence of obesity and experience cardio-metabolic health disparities, have low nut intakes. The objective of this study was to evaluate the impact of almond consumption, relative to an energy-matched LF/HC control food, on weight status and adiposity in Blacks and Hispanics. We hypothesized that 24 wk of almond consumption would improve appetite regulation and body composition in Blacks and Hispanics. Twenty-nine adults (17 completers: 9 men and 8 women), BMI >25 kg/m², age 30-65 y, were recruited and randomized to consume either almonds or LF/HC cereal bars providing 17.5% of their estimated energy requirements. Outcome variables were measured at baseline, week 12, and endpoint. Peptide YY concentrations were higher in the almond group compared to LF/HC (time x treatment effect: p = 0.01). Almonds increased PYY concentrations compared to LF/HC (p = 0.01). Almonds decreased ghrelin concentrations compared to LF/HC (p = 0.01). Almonds had minimal impact on body composition, as measured by changes in BMI, skinfold thickness, and waist circumference. Almonds had minimal impact on appetite satisfaction, as measured by changes in hunger, fullness, and desire to eat.
interaction at 12 wk, P<0.001; 24 wk, P=0.13). Similarly, glucagon-like peptide 1 concentrations were higher in the almond group compared to LF/HC (time x treatment interaction at 12 wk, P=0.10; 24 wk, P=0.015). However, ghrelin levels decreased in LF/HC compared to the almond group at 12 wk but not 24 wk (time x treatment interaction at 12 wk, P=0.017; 24 wk, P=0.23). There was a slight trend for a time x treatment interaction on body weight (P=0.14; change in almond=0.6±1.8 kg; LF/HC=1.9±2.7 kg). There was a time x treatment interaction on inter-muscular adipose tissue (P=0.013; change in almond=0.10±0.14 cm³; LF/HC=0.04±0.07 cm³). There was no effect of almond or LF/HC consumption on inflammatory markers concentrations (interleukin-6, C-reactive protein, and tumor necrosis factor; all p>0.18). Daily almond intake for 24 wk, in the context of a usual diet, does not induce profound body composition changes, but may ameliorate appetite and ectopic fat deposition. More studies should be performed in minority population to determine the potential effects of specific foods for weight management in the context of a weight loss diet.

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**P293**

**Effects of Diets That Vary in Fatty Acid Composition on Fecal Short-chain Fatty Acid Levels and Their Relationship With Circulating Lipids and Lipoproteins**

Kate J. Bowen, Penny M. Kris-Etherton, The Pennsylvania State Univ, University Park, PA; Peter J. Jones, Univ of Manitoba, Winnipeg, MB, Canada; Lavanya Reddivari, Purdue Univ, West Lafayette, IN

**Introduction:** The short-chain fatty acids (SCFA) acetic acid, propionic acid, and butyric acid are microbial-produced metabolites that can influence host physiology through regulation of hepatic cholesterol metabolism. These biologically relevant gut metabolites may play a role in the hypocholesterolemic effects of select dietary components. The objective of this exploratory study was to determine the effects of diets that differ only in fatty acid composition on fecal SCFA levels and to assess their correlations with circulating lipids, lipoproteins, and apolipoproteins. **Hypothesis:** We assessed the hypothesis that dietary fat quality will differentially affect fecal SCFA and there will be significant associations between fecal SCFA levels and those of circulating total cholesterol, low-density lipoprotein-cholesterol (LDL-C), non-high-density lipoprotein-cholesterol (non-HDL-C), and apolipoprotein (apo) B. **Methods:** In a double-blind, randomized, three period crossover, controlled feeding clinical trial, participants with ≥2 metabolic syndrome criteria (n=20) were provided with a weight maintenance, controlled feeding base diet plus conventional canola oil, high-oleic acid canola oil (HOCO), or a control oil (control diet formulated to represent a Western diet fatty acid profile) for 6 weeks followed by washout periods of ≥4 weeks. The macronutrient profiles of the diets were: canola diet [17.5% monounsaturated fatty acid (MUFA), 9.2% polyunsaturated fatty acid (PUFA), 6.6% saturated fatty acid (SFA)], HOCO diet (19.1% MUFA, 7.0% PUFA, 6.4% SFA), and control diet (10.5% MUFA, 10.0% PUFA, 12.3% SFA). Fecal and blood samples were collected at study enrollment and at the end of each diet. **Results:** After 6 weeks, a trend toward a treatment effect on endpoint fecal propionic acid was observed (P=0.09), with a trend toward a higher concentration following the control compared to the canola diet (P=0.09). Acetic acid was increased from baseline following the control diet (P=0.04). After the control diet only, fecal levels of propionic acid were positively correlated with blood levels of LDL-C, non-HDL-C, and apo B (r=0.52 to 0.64, P=0.003 to 0.02),
with a trend for total cholesterol \((r=0.39, P=0.10)\), and acetic acid was positively correlated with LDL-C and apo B levels \((r=0.48 to 0.49, P=0.03 to 0.04)\), with a trend for non-HDL-C \((r=0.44, P=0.06)\). No significant correlations between fecal SCFA and lipids and lipoproteins were observed after the two canola oil-based diets. **Conclusions:** In conclusion, these data suggest that the adverse effects of a contemporary Western diet fatty acid profile on circulating lipid and lipoprotein parameters compared to diets higher in unsaturated fat and lower in SFA may be mediated by gut-derived SCFA.

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**P294**

**Estimated Benefits and Risks of Lowering Sodium Intake With Potassium-based Salt Substitutes in China: a Modelling Study**


**Introduction:** Replacement of regular salt (NaCl) with potassium-based salt substitutes is a promising strategy to reduce blood pressure (BP) and prevent cardiovascular disease (CVD), especially in countries like China with high discretionary salt intake and low potassium intake. However, benefits of this strategy remain uncertain, and the risks of hyperkalemia and increased CVD mortality in persons with chronic kidney disease (CKD) are a concern. **Hypothesis:** In China, the estimated benefits of nationwide potassium-based salt substitution on CVD mortality will exceed potential risks. **Methods:** We used a comparative risk assessment framework to estimate potential benefits and risks of nationwide replacement of discretionary salt with potassium-based salt substitute \((30\pm10\% \text{ KCl})\) on CVD mortality in China. We incorporated existing data and corresponding uncertainties from randomized trials, the China National Survey of CKD, the Global Burden of Disease, and the CKD Prognosis Consortium (**Table**). We estimated averted CVD deaths from reduced BP subsequent to salt substitution in the adult population (benefits), and CVD deaths attributed to hyperkalemia from salt substitution in CKD patients (risks). **Results:** A nationwide implementation of potassium-based salt substitution in China, could prevent \(~400,000\) CVD deaths/ year through BP lowering in the adult population, and increase \(~10,000\) CVD deaths/year through hyperkalemia among CKD patients (**Table**). For each additional death in CKD patients, around \(~40\) CVD deaths could be averted in the adult population. Overall, the intervention could result in \(369,258\) (95\% uncertainty interval: \(160,702-576,680\)) net fewer deaths each year, corresponding to 9.4\% (4.1-14.7) of annual CVD deaths in China. **Conclusions:** A nationwide potassium-based salt substitution in China could result in significant net benefits, preventing about 1 in 10 CVD
deaths. Strategies to avoid potential hyperkalemic deaths among CKD patients could further improve the benefit:risk ratio.

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P295

Synergistic Effect of Food Insecurity and Intimate Partner Violence on Maternal Depressive Symptoms

Sajeevika S Daundasekara, Univ of Houston, Houston, TX; Brittany Schuler, Temple Univ, Philadelphia, PA; Daphne C Hernandez, Arleen Longoria, Univ of Houston, Houston, TX

Background: There are evidence of intimate partner violence (IPV) and food insecurity (FI) as independent predictors of maternal depressive symptoms. However, there are a dearth of studies that have examined how both IPV and FI influence depressive symptoms. The objective of this study was to determine whether IPV, food insecurity, or the combined effect of experiencing both IPV and FI predicted later onset of maternal depressive symptoms.

Method: Data over a nine year time span from Fragile Families and Child Wellbeing study were used for the current study (N=1421). IPV and FI were both measured at three and five years from the child’s birth. IPV was measured using seven items depicting physical and psychological abuse from spouse/partner.

House F2 was measured using the 18-item Food Security Module developed by the United States Department of Agriculture. Four mutually exclusive dichotomous variables were created based on IPV and FI experiences.

Mothers who experienced IPV at least at one time but did not experience FI were classified as “IPV only”. Mothers who experienced FI at least one time but did not experience IPV were classified as “FI only”. Mothers who experienced both IPV and FI at least one time were classified as “both IPV and FI”. The final group “never IPV nor FI” did not experience IPV nor FI. Maternal depressive symptoms at year nine was determined using the Composite International Diagnostic Interview Short Form. Covariate adjusted multivariate logistic regression analysis was used to understand the relation between IPV and FI on onset of depressive symptoms.

Results: Twenty-seven percent of the study sample experienced both IPV and FI, 63% IPV only, 4% FI only, and 6% never. At year nine 18% of the mothers reported depressive symptoms. Majority of the sample were non-Hispanic black (52%) or Hispanic (23%), married/cohabiting (57%), and with a high school or higher education (76%). After controlling for age, race/ethnicity, education, marital status, financial strain and prior depressive symptoms, mothers who experienced both IPV and FI during 3-5 years after child’s birth had significantly higher odds

| Table  
| Synergistic Effect of Food Insecurity and Intimate Partner Violence on Maternal Depressive Symptoms  
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of having depressive symptoms at 9 years after child’s birth (OR=2.10, 95% CI: 1.04, 4.27) compared to mothers experiencing neither. The odds of having depressive symptoms among mothers experiencing either IPV only (OR=1.33, 95% CI: 0.67, 2.66) or FI only (OR=2.34, 95% CI: 0.94, 5.86) was not significantly different from mothers experiencing neither.

Conclusions: Maternal cumulative experiences of IPV and FI three to five years after child’s birth increased the likelihood of later onset of depressive symptoms. Currently IPV, food insecurity and depression are typically addressed in isolation. Using a trauma-informed approach, combining IPV counselling with public/private food assistance programs might be effective in preventing maternal depressive symptoms later in life.


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P296

Almond Consumption in Cardiovascular Disease: Markov Model and Health Economic Evaluation

Jifan Wang, Michelle A Lee-Bravatti, Tufts Univ, Boston, MA; Gowri Raman, Esther E Avendano, Tufts Clinical Evidence Synthesis Ctr, Tufts Medical Ctr, Boston, MA; Elizabeth J Johnson, Tufts Univ, Boston, MA

Background: Heart disease is the leading cause of death in the United States, with over 630,000 deaths in 2015 and over 140,000 stroke-related deaths in the same year. Our recent meta-analysis found lower LDL levels with almond intake. According to the US Food and Drug Administration, 1.5 oz. of any tree nut intake may reduce the risk of cardiovascular disease (CVD). The objective of this study was to use Markov models to examine the cost-effectiveness of almond consumption in preventing CVD. Methods: Decision trees with Markov models were developed for consuming 1.5 oz. almond per day versus no almond and myocardial infarction (MI) and stroke, respectively. We set 20 cycles for Markov models with a 1-year time frame for each cycle. Half-cycle correction was applied in the models. In the MI model, people who survived after having MI were considered as having chronic heart disease; in the stroke model, any type of stroke was included. Quality-adjusted life years at each stage were used as the effectiveness. We derived the parameters from published literature and public sources. Results: Consuming almonds had more effectiveness although it led to more cost. It was not preferred for either MI or stroke. When setting the willingness-to-pay as $50,000, the annual net monetary benefit (NMB) in the MI model was $954,542 for consuming almonds and $958,482 for not consuming almonds; the NMB in the stroke model was $945,096 and $947,414 for the almond and the non-almond, respectively. Conclusion: Consuming 1.5 oz. almond per day may not be cost-effective enough in terms of preventing MI and stroke. Further studies are required to evaluate the overall effect of almond on CVD.

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P297

The Decline in Excess Post-Exercise Oxygen Consumption in Response to Dietary Nitrate is Eliminated With Concurrent Caffeine Intake

Kennedy Marshall, Justin D. Waller, Haley M. Fair, Valerie J. Olzer, James M. Smoliga, Colin R. Carriker, High Point Univ, High Point, NC

Introduction: Dietary nitrate has been shown to reduce submaximal oxygen consumption (VO₂), but less is known about the changes to excess post-exercise oxygen consumption (EPOC). In contrast, caffeine intake increases both exercise VO₂ and EPOC. Minimal research has reported on the combined effects of dietary nitrate/caffeine on exercise and post-exercise metabolism. Hypothesis: Caffeine will elevate exercise VO₂ and EPOC while dietary nitrate will attenuate the change in exercise VO₂ and EPOC.

Methods: Seven healthy individuals participated in a double-blind, placebo controlled, crossover experiment. The first of five visits consisted of a maximal volume of oxygen consumption (VO₂max) treadmill test. Prior to visit 2 - 5, participants consumed either a dietary nitrate (~12.4 mmol, NIT) or placebo nitrate supplement (PLN) combined with either a caffeine (3 mg/kg, CAF) or placebo caffeine (PLC) dose. Supplements were consumed on each of 4 days and the final doses of NIT or PLN and CAF or PLC were consumed 2.5 and 1-hr pre-exercise, respectively. Visits 2 - 5 consisted of a 30-min treadmill run at ~65% VO₂max followed by a 60-min seated recovery. During exercise, VO₂ and heart rate (HR) were measured continuously. During recovery, EPOC, HR, and peripheral (SBP/DBP) and aortic (cSBP/cDBP) blood pressure (via pulse wave analysis) were measured every 20 min. A linear mixed effects model analysis was performed to determine how each supplementation influenced each dependent variable. Treatments (NIT+CAF, CAF+PLN, NIT+PLC, PLN+PLC) and exercise timepoints (10, 20, 30 min) and recovery timepoints (20, 40, and 60 min post-exercise) served as fixed factors. If p<0.05, post-hoc pairwise comparisons were performed.

Results: Exercise VO₂ (p=0.450) and HR (p=0.622) were not different between treatments at any timepoint. However, EPOC was different between treatments (p<0.001); NIT+PLC (4.0±0.6 ml/kg/min) was significantly lower than NIT+CAF (4.7±0.7 ml/kg/min, p<0.001), CAF+PLN (4.6±0.7 ml/kg/min p=0.001), and PLN+PLC (4.7±0.8 ml/kg/min, p=0.001). Recovery PLN+PLC brachial SBP (117±8 mmHg) was significantly lower than NIT+CAF (122±7 mmHg, p=0.041), CAF+PLN (123±9 mmHg, p=0.003), and NIT+PLC (122±6 mmHg, p=0.013). Recovery treatment differences were found for cSBP (p=0.005); PLN+PLC (104±7 mmHg) was significantly lower than CAF+PLN (109±9 mmHg, p=0.001), and NIT+PLC (108±7 mmHg, p=0.013), but not NIT+CAF (107±7 mmHg, p=0.063). Recovery HR was elevated in PLN+PLC (91±14 bpm)
compared to CAF+PLN (86±15 bpm, p=0.029) and NIT+PLC (86±12 bpm, p=0.002). Conclusion: A modest dose of caffeine (3 mg/kg) did not elevate exercise VO\textsubscript{2} or EPOC. Dietary nitrate reduced EPOC and elevated peripheral and aortic SBP in recovery. When caffeine was consumed alongside nitrate, the decrease in EPOC was abolished. Dietary nitrate alone may not be advised to those seeking additional workout caloric expenditure.


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P298

Normotensive Habitual Caffeine Consumers Experience No Change in Blood Pressure or Pulse Wave Velocity Following the Combined Consumption of Caffeine and Dietary Nitrate

Haley M. Fair, Justin D. Waller, Kennedy Marshall, Valerie J. Olzer, James M. Smoliga, Colin R. Carriker, High Point Univ, High Point, NC

Intro: Caffeine intake may elevate blood pressure (BP), while habitual consumption leads to developed tolerance, providing conflicting evidence for incurred changes in BP. Dietary nitrate consumption decreases BP and reduces arterial stiffness in patients with atherosclerosis and hypertension due to increased plasma nitrite and enhanced bioavailability of nitric oxide. However, a decline in BP for a healthy cohort could be an unwanted side effect for normotensive individuals. Less is known about the combined effects of dietary nitrate and caffeine on resting hemodynamics in a healthy population. Hypothesis: We hypothesized that caffeine supplementation would increase systolic blood pressure (SBP) and pulse wave velocity (PWV) while combined dietary nitrate consumption would attenuate this rise.

Methods: In a randomized, double-blind, counterbalanced study, eight healthy, young adults who typically consumed some but not more than 500 mg caffeine/day completed 4 separate visits to the laboratory, each visit separated by one week. Prior to each visit, participants consumed a 4-day supplementation regimen of either dietary nitrate (12.4 mmol, NIT) or a placebo nitrate (PLN) combined with either caffeine (3 mg/kg, CAF) or placebo caffeine (PLC); this comprised 1 of 4 treatments. The final dose of NIT or PLN was consumed 2.5 hours prior to assessments while CAF or PLC was consumed 1 hour prior. Participants minimized consumption of dietary nitrate rich foods and caffeine during the 4 days leading up to their scheduled visit. Each visit consisted of measurements of peripheral SBP and diastolic blood pressure (DBP) with aortic central systolic and diastolic blood pressure (cSBP and cDBP, respectively) assessed noninvasively using pulse wave analysis. Measurement of arterial stiffness via applanation tonometry determined PWV. A linear mixed effects model analysis was performed to determine if supplementation regimen influenced hemodynamic parameters.

Results: SBP of NIT+CAF (115±6 mmHg), PLN+CAF (117±9 mmHg), NIT+PLC (115±6 mmHg) and PLN+PLC (115±6 mmHg)(p=0.591) and PWV of NIT+CAF (5.5±1.1 m/s), PLN+CAF (5.8±0.7 m/s), NIT+PLC (5.8±0.6 m/s) and PLN+PLC (5.6±1.0 m/s) (p=0.353) were not statistically different between treatments. In addition, DBP (p=0.496), cSBP (p=0.656), cDBP (p=0.548), aortic augmentation index (p=0.054), and resting heart rate (p=0.646) were not different between treatments. Conclusion: Following 4 days of caffeine supplementation, habitual caffeine users did not experience any changes in resting hemodynamics when compared to a placebo supplement. In addition, dietary nitrate did not incur any changes in resting metrics whether or not it was consumed alongside caffeine. In this regard, habitual caffeine users are not affected by 3mg/kg doses of caffeine, and dietary nitrate (12.4 mmol/day)
does not further reduce the BP of healthy normotensive adults.


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P299

Racial and Sex-Related Differences in Aortic and Mitral Valve Disease

Petro Gjini, Jodie Franzil, Joseph Nicolazzi, Ajay Dharod, Min Pu, Richard Brandon Stacey, Wake Forest Univ Sch of Med, Winston Salem, NC

Background: With the proliferation of echocardiography, clinicians are detecting more patients with valve disease and identifying valve disease much earlier in its natural course. Understanding the gender and racial differences in prevalence of valve disease may help guide clinicians to allocate resources in researching strategies to prevent progression of valve disease. Methods: We identified 9,625 patients from the echocardiography laboratory database between September 2013 to April 2018 who had a LV ejection fraction ≥ 50%. Data related to left-sided valvular disease, baseline demographics, and clinical history were obtained from our clinical data repository. Crude analyses by sex and race were performed to identify the prevalence of certain valve lesions. Logistic regression was used to adjust these relationships by baseline demographics. Results: Our population was 58% female, 21% African-American (AA) with a mean age of 59 ± 17 years. For moderate/severe aortic stenosis (AS), AA had 2.4% compared to 7.5% in Caucasians (CA; p<0.001), and women had 4.8% compared to 8.5% for men (p<0.001). Adjusting for age, race, sex, height, and weight, AA had lower odds ratio (OR) for AS than CA (OR: 0.47; 95% CI: 0.34-0.64; p<0.001), and women had less AS than men (OR: 0.60; 95% CI: 0.50-0.72; p<0.001), less AR (OR: 0.67; 95% CI: 0.54-0.83; p<0.001), but more MR (OR: 1.29; 95% CI: 1.08-1.53; p=0.004). Conclusion: African-Americans have a lower prevalence of moderate/severe aortic stenosis than Caucasians. Compared to men, women have a lower prevalence of moderate/severe aortic stenosis, lower prevalence of moderate/severe aortic regurgitation, but a higher prevalence of mitral regurgitation.


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P300

Cluster Analysis of Discrepancies Between Self-Reported and Investigator-Assessed Biomeasures of Cardiovascular Disease Risk

Sohye Lee, Univ of Memphis, Memphis, TN; Ruth Lindquist, Univ of Minnesota, Minneapolis, MN

Introduction: Hypertension and obesity are major cardiovascular disease (CVD) risk factors that affect huge numbers of Americans. Although hypertension and obesity are largely preventable and manageable, national statistics evidence that these CVD risks are not effectively managed. Patterns of personal under-estimates of individual risk, i.e., discrepancies between one’s perceived health (self-reported biomeasures) relative to actual health (investigator-assessed biomeasures) may
contribute to delays in seeking care that could result in CVD risk detection and management. **Hypothesis:** We hypothesized that personal patterns of awareness reflecting a higher degree of self-reported underestimation of biomeasures of CVD risk would reveal personal profiles of greater CVD risk. **Methods:** Adults, aged 18 and over were recruited at a large community event. Self-reported systolic and diastolic blood pressure (SBP, DBP; mmHg), weight (lb.) were collected before objective investigator-obtained assessments of SBP, DBP, and weight. K-means (non-hierarchical) cluster analysis was used to divide data into clusters. The z-score of mean differences between self-reported and measured SBP, DBP, and weight were included in the cluster analysis. ANOVA was used to examine differences in variables among clusters. **Results:** A total of 61 subjects were eligible and included in the cluster analysis. The mean age of the sample was 55.2 yrs (range 21 to 73; SD: 12.9) and mostly female (63.9%). Mean SBP, DBP, and weight were 133.8, 77.6, and 176.8, respectively. Three clusters from k-means cluster analysis were identified. Cluster 1 (n=22) had moderate discrepancies, with mean differences in SBP, DBP, weight of 14.0, 3.2, -0.5, respectively. Cluster 2 (n=17) had low discrepancies, with mean differences in SBP, DBP, weight: 3.0, -2.6, 7.1, respectively. Cluster 3 (n=22) showed high discrepancies, with mean differences in SBP, DBP, weight of 27.2, 10.5, 4.5, respectively. There were significant mean differences between Cluster 2 (low discrepancies) and Cluster 3 (high discrepancies) in investigator-obtained SBP and DBP (p<0.01, p<0.05, respectively). **Conclusions:** A wide range of accuracy in personal awareness of biomeasures of risk was uncovered with patterns of discrepancy ranging from low to high; those having a pattern of greatest inaccuracy had significantly higher SBP and DBP (key risk factors for CVD) than those with least inaccuracy. These data highlight the importance of regular objective screening of biomeasures and suggests that relying on personal awareness or self-report of biomeasures is ineffective. The greater discrepancy between self-perceived and investigator-assessed numbers was associated with greater blood pressure-related CVD risks underscoring the potential benefit of arming individuals with information to “know their numbers.”

**Disclosures:** **S. Lee:** None. **R. Lindquist:** None.

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**Funding Component:** **P301**

**Obesity and Mortality: the Jackson Heart Study**

**Yuan-I Min,** Karen A Valle, Pramod Anugu, Yan Gao, Anshul Anugu, Arnita F Norwood, Adolfo Correa, UMMC Jackson Heart Study, Jackson, MS

**Background:** Mortality has been reported to be lower among individuals classified as overweight/obese (based on body mass index (BMI, kg/m²)) when compared with their normal weight counterparts (“obesity paradox”). One possible reason for this apparent paradox is that BMI includes the weight of lean muscle and fat mass, both of which vary with age, sex, and race/ethnicity, and variations in these individual mass measures may not be reflected by the BMI. We compared associations between all-cause mortality and BMI and other obesity measures that may better reflect central adiposity, including waist circumference (WC, cm), waist-to-height ratio (WHtR) and waist-to-hip ratio (WHR) in the Jackson Heart Study (JHS), a prospective cohort study of cardiovascular disease in African Americans. **Methods:** Data from 3,976 JHS participants (441 deaths) who attended Exam 2 (2005-2008) where various measures of obesity were collected, were analyzed. Cox regression models were used to evaluate the associations between obesity and all-cause mortality. “Time 0” for the survival analysis was the date of Exam 2 and the
administrative censoring date was 12/31/2015. Obesity measures were analyzed as categories based on standard cut-points defining obesity and as quintiles. Covariates include age, sex and smoking. The predictive abilities of these obesity measures were assessed using c-index.

Results: The age-sex-smoking adjusted mortality rates were the lowest among participants who were overweight (BMI 25-30) or with class I obesity (BMI 30-35). However, compared to normal weight participants (BMI 18.5-25), only participants with class III obesity (BMI ≥40) had a significantly higher mortality (adjusted HR [aHR] 1.92 [95% CI 1.34-2.75]). In addition, higher mortality was associated with obesity defined by WC (>102 in men/>88 in women vs. ≤102 in men/≤88 in women; aHR 1.45 [1.16-1.82]) and by WHR (≥0.9 in men/≥0.85 in women vs. <0.9 in men/<0.85 in women; aHR 1.54 [1.21-1.95]); but not by BMI (≥30 vs. <25; aHR 1.04 [0.79-1.37]) or WHtR (≥0.5 vs. <0.5; aHR 1.03 [0.72-1.49]). Sex-stratified analyses suggest the stronger predictor for mortality was WC-defined obesity in men and WHR-defined obesity in women; however, test for interactions were not statistically significant. The associations were not found to vary by age (>65 vs. ≤65 years). Analyses using quintiles showed that the 5th quintiles were associated with a significant increase in mortality compared with the 1st quintiles for all obesity measures. The c-indexes were comparable for all obesity measures.

Conclusions: The “obesity paradox” was suggested in the JHS based on BMI. However, only morbidly obese participants had a significantly higher mortality than normal weight participants. The recommended cut-points for defining obesity based on WC and WHR were significantly associated with increased mortality in this large cohort of African Americans.


Funding: No

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Hand Osteoarthritis is associated With Subclinical Cardiovascular Disease in Mexican Women

Rodrigo R Flores-Mariñelarena, Sch of Med, Monterrey Inst of Technology and Higher Education, Mexico City, Mexico; Mario H Flores-Torres, Ruy Lopez-Ridaura, Martín Lajous, Natl Inst of Public Health, Mexico City, Mexico; Carlos Cantú-Brito, Natl Inst of Medical Science and Nutrition, Mexico City, Mexico; Andres Catzin-Kuhlmann, Natl Inst of Public Health, Mexico City, Mexico

Introduction: Osteoarthritis is a growingly common joint disorder affecting older adults. It is characterized by chronic low-grade inflammation, a phenomenon by itself considered a cardiovascular risk factor. However, data on its potential impact on cardiovascular disease (CVD) is scarce. Assessing hand osteoarthritis (HOA) might be advantageous when studying CVD as this particular location might be less affected by traditional cardiovascular risk factors such as overweight and physical activity.

Hypothesis: HOA is associated with subclinical CVD.

Methods: We cross-sectionally assessed the relationship between HOA and CVD in 1,803 women from the Mexican Teachers’ Cohort, excluding those with history of myocardial infarction, cerebrovascular disease, and rheumatoid arthritis. From 2012 to 2016, a subsample of the MTC participants from Mexico City and the states of Nuevo León, Chiapas, and Yucatán were invited for clinical examinations in which standardized neurologists measured their carotid intima-media thickness (IMT) with ultrasound and a standardized HOA questionnaire was applied. HOA was defined as having ≥45 years, hand joint pain, and morning stiffness that lasts no longer than 30 minutes. Subclinical CVD was assessed through log-
transformed IMT, and carotid atherosclerosis (CAS) was defined as mean right or left carotid IMT ≥0.8 mm or the presence of atherosclerotic plaque. Multivariable linear and logistic regression analyses were used to evaluate the association between HOA and IMT and CAS adjusting for age, state, smoking, alcohol consumption, diabetes, hypertension and body mass index.

**Results:** Among participants with a mean age of 51 years (±4), 18.4% met the criteria for HOA, and the prevalence of CAS was 23.1%. After multivariable adjustment, women diagnosed with HOA had 1.6% (95%CI 0.2, 3.1) higher mean IMT than those without the joint disease. Similarly, women with HOA had 35% (95%CI 1.01, 1.81) higher odds of CAS. Sensitivity analyses using a less stringent definition of OA (pain regardless of stiffness), as well as incapacitating pain, did not have a significant association with CAS.

**Conclusion:** Among middle-aged women, HOA was associated with subclinical CVD. This relation might be due to low-grade chronic inflammation, but further research is needed to clarify the underlying mechanisms, the role of screening for HAO as part of cardiovascular risk profiling, and the value of potential interventions such as anti-inflammatory drugs.


Funding: No

Funding Component:

P303

**Clinically Recognized Varicose Veins and Physical Function in Older Individuals: The Atherosclerosis Risk in Communities (ARIC) Study**

Yejin Mok, Junichi Ishigami, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Anna Kucharska-Newton, Gillings Sch of Global Public Health, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Maya Salameh, Johns Hopkins Univ Sch of Med, Baltimore, MD; Jennifer Schrack, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Priya Palta, Gillings Sch of Global Public Health, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Josef Coresh, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; B. Gwen Windham, Univ of Mississippi Medical Ctr, Jackson, MS; Pamela Lutsey, Aaron Folsom, Sch of Public Health, Univ of Minnesota, Minneapolis, MN; Kunihiro Matsushita, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD

**Background:** Varicose veins recently attract attention in medical community due to its high prevalence and potential impact on major clinical consequences like deep venous thrombosis. Also, a few small studies (n<50) have reported that patients with varicose veins have reduced physical function than those without. However, a large study is required to quantify the association of varicose veins and reduced physical function in the community.

**Methods:** In 6,506 ARIC participants (aged 71-90 years, 2011-2013 at visit 5), varicose veins were identified using outpatient and inpatient ICD codes from Medicare claims (sample limited to fee for service beneficiaries) or hospitalization data after visit 1 through visit 5. We assessed the cross-sectional associations of clinically recognized varicose veins with the Short Physical Performance Battery (SPPB) score (0-12) (based on the sum of scores from three components [chair stands, standing balance, and gait speed] [0-4 points each]) and frailty (frail if ≥3 of the five components [weight loss, exhaustion, low physical activity, slow walking, and grip strength]).

**Results:** There were 361 participants with a clinical diagnosis of varicose veins (124 inpatient and 256 outpatient). Varicose veins were independently associated with poor physical function (SPPB ≤6 vs. >6) (adjusted odds ratio 1.72 [95% CI 1.24, 2.37]) and with all individual components of the
SPPB (Table). Similarly, varicose veins were associated with being frail (frailty ≥3 vs. <3) (adjusted odds ratio 1.76 [95%CI 1.26, 2.46]) and with only slower walking of frailty components. Conclusions: In community-dwelling older adults, persons with varicose veins had lower physical function and were more frail compared to their counterparts. Longitudinal research is warranted to explore the temporality between varicose veins and reduced physical function.

### Table. Odds ratio (95% CI) of poor physical function or frailty measures in relation to varicose veins

<table>
<thead>
<tr>
<th>Physical Function</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPPB (c2)</td>
<td>2.33 (1.79, 3.06)</td>
<td>1.72 (1.24, 2.37)</td>
</tr>
<tr>
<td>Chair Stands (c2)</td>
<td>3.17 (1.40, 6.92)</td>
<td>1.43 (0.51, 4.20)</td>
</tr>
<tr>
<td>Standing Balance (c2)</td>
<td>3.88 (1.48, 9.95)</td>
<td>1.44 (0.59, 3.51)</td>
</tr>
<tr>
<td>Gait Speed (c2)</td>
<td>2.40 (1.36, 4.25)</td>
<td>1.96 (1.18, 3.29)</td>
</tr>
</tbody>
</table>

**Frailty Phenotype**

<table>
<thead>
<tr>
<th>Frailty score (c2)</th>
<th>2.37 (1.77, 3.18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exhale</td>
<td>1.42 (1.08, 1.87)</td>
</tr>
<tr>
<td>Low physical activity</td>
<td>1.32 (1.05, 1.66)</td>
</tr>
<tr>
<td>Sit walking</td>
<td>2.64 (1.68, 4.16)</td>
</tr>
<tr>
<td>Grip strength</td>
<td>1.45 (1.18, 1.79)</td>
</tr>
</tbody>
</table>

Disclosures:  
Y. Mok: None.  
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K. Matsushita: None.

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**P304**

**Underuse of Cardiovascular Medications in Individuals With Lower Extremity Peripheral Artery Disease: the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)**

Simin Hua, Carmen R Isasi, Albert Einstein Coll of Med, Bronx, NY; Jorge R Kizer, San Francisco Veterans Affairs Health Care System, San Francisco, CA; Kunihiro Matsushita, Johns Hopkins Univ Bloomberg Sch of Public Health, Baltimore, MD; Matthew A Allison, Univ of California San Diego, La Jolla, CA; Qibin Qi, Albert Einstein Coll of Med, Bronx, NY; Sonia G Ponce, Univ of California San Diego, La Jolla, CA; Wassim Tarraf, Wayne State Univ, Detroit, MI; Martha Daviglus, Univ of Illinois at Chicago, Chicago, IL; Robert Kaplan, Albert Einstein Coll of Med, Bronx, NY

**Introduction:** The underuse of cardiovascular therapies among individuals with lower extremity peripheral artery disease (PAD) has been reported. However, little is known about this in the Hispanic/Latinos, who may have limited access to health care and worse clinical outcomes than non-Hispanics.

**Methods:** We studied the cross-sectional use of cardiovascular therapies including antiplatelet, lipid-lowering and antihypertensive medications among 826 HCHS/SOL participants who reported a PAD diagnosis by a physician. We studied the factors that may be associated with use of cardiovascular medications, including demographic, socioeconomic factors, acculturation, access to health care and comorbidities. Survey Poisson regression was used to generate the prevalence ratios. Factors in age-adjusted models with P≤0.10 were included in multivariate regression.

**Results:** A total of 723 participants with medical history of PAD were free of coronary heart disease (CHD, mean age=53) while 103 patients had concurrent CHD (mean age=56). The overall age-adjusted prevalence of antiplatelet, lipid-lowering and antihypertensive medications were 31%, 26% and 34%, respectively. Individuals of Mexican background had low health insurance coverage (42%) and low use of antiplatelet (20%), statin (17%) and antihypertensive (47% among hypertensive individuals) medications. More advanced age, number of doctor visits (2+ vs 0-1) in the past year and number of cardiovascular risk factors (2+ vs 0-1) were significantly associated with using cardiovascular medications in adjusted models. Compared with those with PAD alone, individuals with PAD and concurrent CHD were more likely to use antiplatelet (PR=1.44, 95% CI 1.13-1.82) and statin (PR=1.56 [1.17-2.07])
treatment in the multivariate analysis.  

Conclusions: We found underuse of cardiovascular medications among Hispanic/Latino individuals with medical history of PAD. More efforts should be directed in eliminating treatment disparities in this important race-ethnic group.


Funding: No

Funding Component:

P305

Alternative Ankle Brachial Index Calculation and CVD Events and Mortality: The Multi-Ethnic Study of Atherosclerosis (MESA)

Jonathan Unkart, Matthew Allison, Maria Rosario Araneta, Joe Ix, Univ of California San Diego, La Jolla, CA; Mary McDermott, Northwestern Univ, Chicago, IL; Michael Criqui, Univ of California San Diego, La Jolla, CA

Introduction

The ankle brachial index (ABI) is independently associated with cardiovascular disease (CVD) events and mortality. The recommended ABI calculation for the ankle pressure involves taking the higher (ABI-TRAD) of the dorsalis pedis (DP) or posterior tibial (PT) arteries in the lower of the two legs. However, little is known about using the lower (ALT-ABI) of the DP/PT in evaluating CVD endpoints.

Methods

Using a multiethnic cohort free of known CVD disease at baseline, participants with complete ABI assessment were followed for incident CVD events, CVD mortality and all-cause mortality. ABI was assessed as categories: low (≤0.9), borderline (0.9-1.0), low-normal (1.0-1.1), normal (1.1-1.4) and high (≥1.4) and continuously using ALT-ABI. Leg symptoms were assessed with the San Diego Claudication Questionnaire. We used cox models to assess associations between ALT-ABI and outcomes adjusting for age, gender, race/ethnicity, ASCVD risk score and leg symptoms.

Results

Of the 6,669 participants with complete ABI measures, the mean ALT-ABI was 1.03 +/- 0.12 versus ABI-TRAD of 1.10 +/- 0.11. The mean age of participants was 62 years and 1,625 (24.4%) reported some type of leg pain with walking. At a median follow up of 14.2 years, 1,214 deaths, 657 CVD events, and 288 CVD-specific deaths had occurred. Of the 824 individuals with low ALT-ABI, 581 (70.5%) had an ABI > 0.9 using ABI-TRAD. As seen in the Table, lower values and categories of ALT-ABI were associated with increased risk of CVD events, CVD and all-cause mortality.

<table>
<thead>
<tr>
<th>Variable</th>
<th>ALT-ABI (n=824)</th>
<th>ABI-TRAD (n=824)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>460 (55.6%)</td>
<td>581 (70.5%)</td>
</tr>
<tr>
<td>Borderline</td>
<td>206 (25.1%)</td>
<td>177 (21.5%)</td>
</tr>
<tr>
<td>Low-normal</td>
<td>63 (7.6%)</td>
<td>17 (2.1%)</td>
</tr>
<tr>
<td>Normal</td>
<td>42 (5.1%)</td>
<td>13 (1.6%)</td>
</tr>
<tr>
<td>High</td>
<td>27 (3.3%)</td>
<td>2 (0.3%)</td>
</tr>
</tbody>
</table>


Funding: No

Funding Component:

P305

Alternative Ankle Brachial Index Calculation and CVD Events and Mortality: The Multi-Ethnic Study of Atherosclerosis (MESA)
Conclusions
Using ALT-ABI identified more individuals with an ABI ≤ 0.9. The ALT-ABI is significantly associated with CVD outcomes, even in asymptomatic individuals. Significant risk increases were present even in those with a low-normal ALT-ABI. While clinical guidelines recommend further workup and risk reduction in individuals with leg symptoms and an ABI-TRAD ≤ 0.9, this method of ABI calculation and cutoff may misidentify individuals at-risk for adverse CV outcomes.


Funding: No

Funding Component:
P306
Proportion of Community-dwelling Older Adults Potentially Benefiting From the Detection of Peripheral Arterial Disease (PAD) With Ankle-Brachial Index: the Atherosclerosis Risk in Communities (ARIC) Study

Yijing Feng, Shoshana Ballew, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Corey A Kalbaugh, Dept of Surgery, Divs of Vascular & Cardiothoracic Surgery, Univ of North Carolina, Chapel Hill, NC; Michelle L Meyer, Dept of Epidemiology, Univ of North Carolina at Chapel Hill, Gillings Sch of Global Public Health, Chapel Hill, NC; Hirofumi Tanaka, Dept of Kinesiology and Health Education, Univ of Texas at Austin, Austin, TX; Gerardo Heiss, Dept of Epidemiology, Univ of North Carolina at Chapel Hill, Gillings Sch of Global Public Health, Chapel Hill, NC; Mathew Allison, Dept of Family Med and Public Health, Univ of California San Diego, La Jolla, CA; Maya Salameh, Johns Hopkins Univ Sch of Med, Baltimore, MD; Josef Coresh, Kunihiro Matsushita, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD

Background
The value of detecting PAD using the ankle-brachial index (ABI) among asymptomatic adults is controversial. However, the detection of PAD can help informing cardiovascular preventive therapy (e.g., statin and aspirin) and identifying PAD as a potential cause of reduced leg function which may be improved by exercise therapy. No previous studies have quantified the proportion of community-dwelling older adults who may benefit from PAD detection from these perspectives.

Methods
In 4375 ARIC participants aged 66-90 between 2011-2013 without previously diagnosed PAD, we assessed the proportion of participants with newly detected PAD based on ABI who were not taking statin or aspirin and had reduced leg function (defined as the Short Physical Performance Battery score ≤9). Subsequently, we explored factors associated with higher odds of potentially benefitting from the detection of PAD (i.e., not taking statin/aspirin or having reduced leg function despite the presence of PAD) using logistic regression models. ABI ≤0.9 was the primary definition of PAD, but according to recent guidelines we secondarily explored ABI ≤1.0 or >1.4.

Results
There were 236 (5.4%) participants with an ABI ≤0.9, among which 119 were not taking statin or aspirin and 151 had reduced leg function (77 having both conditions), leading to 193 (4.4%) participants potentially benefitting from PAD detection with ABI. The corresponding proportion was 12.4% (544) when abnormal ABI was defined as ≤1.0 or >1.4. Older age (per 10 years), black race, and current smoking were strongly associated with higher odds of potentially benefitting from detection of PAD (adjusted odds ratio >2.5). The proportion of benefitting from PAD detection was especially high in current smokers followed by blacks (proportions shown in Figure1).

Conclusions
Up to 12.4% of community-dwelling older adults may benefit from PAD detection with ABI. The proportion are especially high among
current smokers and black race, with implications on targeted ABI assessment for detecting PAD.


Funding: Yes

Funding Component:

P307

Additional Prognostic Value of Toe-Brachial Index Beyond Ankle-Brachial Index in Hemodialysis Patients

Manabu Hishida, Johns Hopkins Univ, Baltimore, MD; Takahiro Imaizumi, Pennsylvania Univ, Philadelphia, PA; Masaki Okazaki, Nagoya Univ, Nagoya, MD; Shoichi Maruyama, Nagoya Univ, Nagoya, Japan; Kunihiro Matsushita, Johns Hopkins Univ, Baltimore, MD

Background: Although ankle-brachial index (ABI) is considered the first-line diagnostic test for peripheral artery disease (PAD), ABI can be falsely elevated in some patients with uncompressible ankle arteries. In those patients, toe-brachial index (TBI) is recommended as an alternative test. However, whether TBI provides additional prognostic information beyond ABI is unknown. Methods: We examined data from 247 Japanese dialysis patients (mean age 66 years). ABI and TBI were measured bilaterally on the same day, and the lower values were used for analysis. We explored quartiles of ABI and TBI as well as three categories of low ABI (≤0.9), normal/high ABI (>0.9) + low TBI (≤0.6), and normal/high ABI + normal TBI (>0.6) (very few with low ABI and normal TBI). Multivariable Cox models were used to quantify the associations of ABI and TBI with all-cause mortality. Results: During a mean follow-up of 5.2 years, we observed 116 deaths. As anticipated, ABI showed a J-shaped association with mortality, with the higher risk seen in the lowest quartile (adjusted hazard ratio 2.70 [95% CI 1.38-5.30]) and the highest quartile (1.46 [0.73-2.90]) vs. the second highest quartile. In contrast, lower TBI showed a dose-response association with mortality (e.g., adjusted hazard ratios 2.41 [1.16-5.01] and 2.21 [1.04-4.71] in the lowest two quartiles vs. the highest quartile). When three categories by ABI and TBI were analyzed, low ABI showed worst prognosis, followed by normal/high ABI + low TBI and then normal/high ABI + normal TBI (Figure). Higher mortality risk in normal/high ABI + low TBI vs. normal/high ABI + normal TBI remained significant after accounting for potential confounders (adjusted hazard ratio 1.84 [1.04-3.25]). Conclusions: Lower TBI was independently associated with higher mortality risk in patients on dialysis and classified risk in patients with normal/high ABI. Our results support the importance of evaluating TBI in addition to ABI in dialysis patients.
The Association of Height With Incident Peripheral Arterial Disease in the Atherosclerosis Risk in Communities (ARIC) Study

Steven P Menez, Lucia Kwak, Ning Ding, Caitlin Hicks, Morgan Grams, Johns Hopkins, Baltimore, MD; Aaron Folsom, Univ of Minnesota, Minneapolis, MN; Gerardo Heiss, Univ of North Carolina at Chapel Hill, Chapel Hill, NC; Elizabeth Selvin, Bernard Jaar, Kunihiro Matsushita, Johns Hopkins, Baltimore, MD

**Background:** A number of cross-sectional studies have reported shorter height as a risk factor for peripheral artery disease (PAD) defined by low ABI. People of shorter stature may have a naturally lower ABI stemming from a relatively lower ankle blood pressure, as function of the shorter distance from the heart to the distal leg arteries. If shorter height is related to PAD, height should also be associated with clinical PAD. We aimed to investigate the association of height with clinical PAD and critical limb ischemia (CLI) in a prospective cohort analysis.

**Methods:** Using data from the ARIC Study, we investigated the association of height with development of PAD and CLI, defined based on ICD-9 codes, for the 14,668 participants at Visit 1 without prevalent PAD/CLI over a median follow-up time of 25.9 years. We modeled risk for PAD and CLI over time using Cox proportional hazards regression.

**Results:** 6,652 (45.4%) participants were men, with a mean age of 55 (SD 6) years old, compared to 54 (SD 6) years old in women. 1,460 (22%) men and 2,321 (29%) women were African American. Men tended to be taller and have a higher weight compared to women. Within each sex, there were no significant differences by quartile of height in terms of demographic factors or clinical comorbidities. For men in height quartile 2 compared to quartile 1, there was a decreased risk of PAD in unadjusted analysis (HR=0.69; 95% CI 0.51-0.94). However, this HR was no longer significant after full adjustment (Table 1). In women, the risk of CLI was higher in the fourth quartile of height compared to quartile 1 after adjustment for demographic factors (HR=1.69; 95% CI: 1.00-2.84). However this HR also became non-significant after full adjustment.

**Conclusions:** In contrast to previous cross-sectional studies which showed and association between shorter height and PAD based on ABI, our prospective study showed null associations between height and clinical PAD.

**Table 1: Multivariable Cox Proportional Hazard Ratios (95% CI) Relating Incident PAD and CLI to Height in Men and women, ARIC**

![Table 1](image-url)


Funding: No

Funding Component:

P309
The High Risk of Venous Thromboembolism in Black Americans


Background: Reports suggest a higher risk of venous thromboembolism (VTE) in Black persons compared to Whites. The major clinical presentations of VTE, pulmonary embolism (PE) and deep venous thrombosis (DVT) are considered parts of the same pathological process and generally share the same risk factors. Sparse data raise the possibility of additional Black/White disparity in clinical VTE presentation; specifically, larger proportions of presentation with PE in Blacks than Whites and vice versa with DVT in Whites compared to Blacks. We present here relevant data from a new study with 4,674 VTE subjects.

Hypothesis: The Black/White disparity in VTE may be concentrated in greater risk of Blacks for PE.

Methods: We studied composite VTE risk in 61,459 members of a comprehensive health plan, who had supplied self-classified ethnicity data on prior health examinations between 1978 and 1985 and remained plan members in 1996, when out-patient diagnoses were added to electronic health records. Subjects were 28% Black (n = 17,442), and 53% White (n = 32,557). From 1996 through 2015, at least one diagnosis of VTE was made during an outpatient visit or hospitalization for 4,675 persons (1,554 Black and 2,576 White). With Whites as referent we performed logistic regressions with 5 covariates. Models stratified by race were performed to explore traits of specific VTE codes and circumstances of diagnosis (hospitalization, out-patient, etc.).

Results: The table shows HRs (95% CI) of Blacks vs Whites. Increased VTE risk of Blacks in each sex was entirely concentrated in subjects with PE and with hospitalization diagnoses. Among covariates sex, education, and smoking were unrelated to VTE risk while BMI was directly associated; results were similar in Whites, Blacks and race-stratified models within the diagnosis code and location of diagnosis groups. Conclusion: Compared to Whites, Black persons have an unexplained increased risk of PE but not of DVT.


Funding: No

Funding Component:

P310

Erectile Dysfunction and Venous Thromboembolism Risk in the Health Professionals Follow-up Study


Introduction: Erectile function requires both intact arterial inflow and venous occlusion, and
it has thus been posited that erectile dysfunction (ED) could be a marker of cardiovascular risk. Although a positive association between ED and arterial thrombotic risk has been well-characterized, whether ED is associated with venous thromboembolic event risk is unknown. **Hypothesis:** ED is positively associated with risk of incident venous thromboembolism (VTE) events, including both deep vein thrombosis (DVT) and pulmonary embolism (PE).

**Methods:** Eligible men were Health Professionals Follow-up Study (HPFS) participants without VTE and prostate cancer prior to baseline in 2000 (n=27,771). As part of biennial mailed questionnaires, men reported their current erectile function in 2000, 2004, and 2008, which was categorized as ED presence (“very poor” or “poor” erectile function) or ED absence (“fair”, “good”, or “very good”). Self-reported incident VTE included the first occurrence of either PE or DVT. We used Cox Proportional Hazards models to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for VTE associated with time-varying ED presence versus absence, with participants censored at death, warfarin use, loss to follow-up, or incident prostate cancer. Multivariable analyses adjusted for age, smoking, body mass index, physical activity, caloric intake, race, alcohol consumption, aspirin use, diabetes, hypertension, hypercholesterolemia, myocardial infarction/angina, and cancer. **Results:** Over 256,678 person-years of follow-up, men self-reported 665 VTE events. At baseline, men were on average 65 years of age and 31% reported presence of ED. In multivariable-adjusted analyses, ED presence was associated with a 30% greater risk of incident VTE (HRadj=1.3; 95% CI: 1.1, 1.6; erectile function linear p-trend=0.003). Estimates were similar in sensitivity analyses of the smaller subgroup of confirmed PE (n=196 PEs confirmed by medical record review/participant reconfirmation or self-reported among persons with prior cancer) (HRadj=1.3; 95% CI: 0.9, 1.8). **Conclusions:** Presence of ED was positively associated with VTE risk in this study of U.S. men, even after multivariable adjustment for traditional cardiovascular risk factors, suggesting that ED has potential as a marker of VTE risk.


Funding: No

**P311**

**Testosterone Therapy and Risk of Venous Thromboembolism Among Men Without Hypogonadism**

**Rob F Walker,** Div of Epidemiology and Community Health, Univ of Minnesota, Minneapolis, MN; Neil A Zakai, Larner Coll of Med at the Univ of Vermont, Burlington, VT; Richard F MacLehose, Div of Epidemiology and Community Health, Univ of Minnesota, Minneapolis, MN; Logan T Cowan, Jiann-Ping Hsu Coll of Public Health, Georgia Southern Univ, Statesboro, GA; Alvaro Alonso, Dept of Epidemiology, Rollins Sch of Public Health, Emory Univ, Atlanta, GA; Pamela L Lutsey, Div of Epidemiology and Community Health, Univ of Minnesota, Minneapolis, MN

Introduction: Testosterone therapy (TT) prescriptions among men increased over 300% from 2001 to 2013 because of relaxed TT prescription guidelines for common symptoms (such as low libido and fat redistribution) associated with natural declines in testosterone as age increases. After concern about possible adverse cardiovascular effects from TT prompted a FDA warning in 2014, prescriptions of TT initially decreased and then plateaued. TT is often prescribed without clear clinical indication of a true hypogonadism diagnosis. TT may increase VTE risk through hematocrit levels which affect blood viscosity and platelet...
accumulation for up to 6 months. Previous studies regarding the association between TT and VTE are both limited and unclear.

Objective: Using a case-crossover design, we assessed whether TT exposure increases the short-term risk of VTE. We also evaluated whether the association differed by age group.

Methods: The case-crossover study included men diagnosed with VTE identified using validated algorithms from 2012 to 2016 in the U.S. MarketScan Commercial and Medicare Supplemental administrative database. After excluding participants with cancer and those with hypogonadism (for which TT is clinically indicated), we identified 36,251 male VTE patients with at least 1 year of follow-up prior to their diagnosis and evaluated whether they had a prescription for TT preceding their first VTE (0-6 months, 'case period' and 6-12 months 'control period'). Conditional logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals (CI) of TT in the case period relative to the control period, after adjusting for number of hospitalizations per period. Associations were also evaluated separately in VTE patients <65 vs. 65+ years old.

Results: Overall, 754 out of the 36,251 patients (2.1%) had at least 1 TT prescription during the 12 months prior to their VTE event. Of these, 588 were aged less than 65 years (78.0%) and 166 were aged 65+ years. Overall, use of TT did not vary substantially in the case period compared to the control period (OR: 1.19; 95% CI: 0.86, 1.64). However, the point estimate was slightly elevated for TT use (vs. no TT use) among men under 65 years old (OR: 1.31; 0.91, 1.89). For men aged 65+ the OR was 0.85 (95% CI: 0.42, 1.69).

Conclusions: Overall TT was not associated with greater risk of VTE among this population of men without hypogonadism. However, when stratified by age sub-group there was some suggestion of a higher association of TT in younger men. This analysis suggests that TT overall is not a strong risk factor for VTE; however further studies are needed to determine if supraphysiologic TT doses especially those associated with polycythemia could increase VTE risk.


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P312

Abstract 14806: Association of Television Viewing With Incident Venous Thromboembolism: The REasons for Geographic and Racial Differences in Stroke (REGARDS) Study

Jordan Munger, Insu Koh, Univ of Vermont Larner Coll of Med, Burlington, VT; George Howard, Virginia Howard, Ryals Sch of Public Health Univ of Alabama at Birmingham, Birmingham, AL; Timothy Plante, Mary Cushman, Neil Zakai, Univ of Vermont Larner Coll of Med, Burlington, VT

Introduction:
Previous studies have linked TV watching with increased venous thromboembolism (VTE) risk independent of physical activity or other VTE risk factors. This finding warrants replication in a contemporary and geographically diverse cohort.

Hypothesis
We hypothesized that TV watching is associated with increased hazard of VTE independent of physical activity and other VTE risk factors.

Methods:
From 2003-2007 REGARDS enrolled 30,239 participants aged 45+ years, who were surveyed for baseline TV viewing behavior and followed for VTE events. Daily TV viewing was categorized as <2 hours, 2 to 4 hours, and 4+ hours. Physical activity was classified as high, medium or low based on weekly number of times participants reported activity sufficient to work up a sweat. Excluding those with
prebaseline VTE, log-rank tests and Cox proportional hazards models were used to describe associations, adjusting for physical activity, age, sex, BMI, race, region, C-reactive protein (CRP) and estimated glomerular filtration rate (EGFR). In a sensitivity analysis, missing data were imputed by multiple imputation with chained equations.

**Results:**
TV viewing was not associated with increased VTE incidence by the log-rank test (p=0.33). In multivariable models shown in Table, greater TV watching did not increase VTE risk. In the complete case and imputation analyses, established VTE risk factors (older age, male sex, obesity, and CRP) were strongly associated with VTE. Depending on the model, high or medium physical activity was either significantly protective or trended towards protective against VTE (Table).

**Conclusions:**
In this contemporary cohort, in contrast to earlier studies, TV watching was not associated with VTE risk after accounting for confounders including obesity and physical activity. Traditional risk factors were associated with VTE risk suggesting this is not a cohort-specific issue. Findings could be due to differences in risk factor profiles in older and newer studies or differences in measurements of TV watching.


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**P313**

**Sport Participation Associated With Fewer Anxiety Symptoms in Adult Congenital Heart Disease**

**Jong Ko,** The University of Texas Southwestern Medical Ctr, Dallas, TX; Kamila White, Univ of Missouri, St. Louis, MO; Adrienne Kovacs, Oregon Health & Science Univ, Portland, OR; Kristen Tecson, Baylor Heart and Vascular Inst, Dallas, TX; Junko Enomoto, Chiba Cardiovascular Ctr, Chiba, Japan; Philip Moons, KU Leuven - Univ of Leuven, Leuven, Belgium; Ari Cedars, The University of Texas Southwestern Medical Ctr, Dallas, TX; APPROACH-IS Consortium and International Society for Adult Congenital Heart Disease

**Introduction:**
Physical activity (PA) has well-known benefits for mental health, which is closely related to clinical outcomes in patients with heart disease; however, little is known about the relationship between PA and anxiety. In this study, we examined their association in a large international cohort of adult congenital heart disease (ACHD) patients. **Hypothesis:** We hypothesize that different PA types would have differential impact on anxiety symptoms.

**Methods:** We conducted a cross-sectional assessment of data derived from the Assessment of Patterns of Patient-Reported Outcomes in Adults with Congenital Heart Disease - International Study. This study enrolled 4,028 ACHD patients from 24 centers in 15 countries. Anxiety symptoms were assessed with the Hospital Anxiety and Depression Scale (HADS). Participants reported whether they were regular active commuters (either walk or cycle to work/school) and/or...
regular sport participants (either recreational or competitive). To assess the relationship between PA and anxiety, we constructed ordinal logistic mixed models, treating country as a random effect. We built an optimally-adjusted model via stepwise selection, which considered all variables having significant relations with anxiety in bivariate analyses and missing at a rate of < 5%. Results: Of 3,893 patients (mean age of 35 ± 13) who completed the HADS, 53% were female; 27% reported elevated anxiety symptoms (i.e., HADS ≥ 8). No significant relationship was found between active commute and anxiety symptoms in bivariate analysis while sport participation was associated with a 40% lower risk of elevated anxiety. The benefit of sport participation on anxiety remained, even after accounting for relevant demographic and clinical variables (adjusted OR=0.769; 95% CI 0.654 - 0.906; p = 0.002) (Table 1). Conclusion: Sport participation is associated with fewer symptoms of anxiety. In conclusion, individualized sport-related exercise prescriptions may reduce anxiety symptoms in cardiac patients.

<table>
<thead>
<tr>
<th>Model</th>
<th>Odd Ratio</th>
<th>Lower</th>
<th>Upper</th>
<th>P-value</th>
</tr>
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<td>0.763</td>
<td>1.092</td>
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<td>0.516</td>
<td>0.704</td>
<td>&lt;0.001</td>
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<td>0.769</td>
<td>0.654</td>
<td>0.956</td>
<td>0.082</td>
</tr>
</tbody>
</table>

*Covariates considered to build the optimal statistical model via stepwise selection are mood disorder, psychiatric disorder, NYHA class.


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Community-Based Sample: Houston TRAIN Study

Kelley Pettee Gabriel, UT Sch of Public Health, Austin, TX; Casey P Durand, UT Sch of Public Health, Houston, TX; Gregory Knell, UT Sch of Public Health, Dallas, TX; Deborah Salvo, Washington Univ, St. Louis, MO; Erin Dooley, Ashleigh M Johnson, Harold W Kohl III, UT Sch of Public Health, Austin, TX

Background. Inadequate physical activity and prolonged sedentary behavior is related to premature mortality and suboptimal cardiovascular health. Yet, the health impacts of these behaviors are typically considered in isolation using a single method assessment approach. Use of accelerometer and reported data from a diverse sample provides the novel opportunity to identify and characterize distinct phenotypes to improve exposure ascertainment.

Methods. Data are from 366 participants (61.4% female; 70.3% non-white; aged 50.7 years) enrolled in the Houston Travel Related Activity in Neighborhoods (TRAIN) Study; a natural experiment designed to determine the effect of a light rail train expansion on transit use and physical activity. Latent class analysis using baseline accelerometer (ActiGraph wGT3X-BT) and reported (self-administered, 7-day Modifiable Activity Questionnaire) data were used to derive the phenotypes and multinomial regression models were used to determine correlates of membership.

Results. Four phenotypes emerged with the majority classified as Phenotype 4 or insufficient activity and high sedentary (Table 1). When compared to Phenotype 2 (reference group), women were less likely than men to be classified as Phenotype 1 or 3. Every 1 kg/m² increase in body mass index increases the odds of membership in Phenotype 3 or 4 when compared to Phenotype 2. Black participants were more likely, and participants identifying as mixed race were less likely, than white participants to be classified as Phenotype 3 compared to Phenotype 2 (all p<0.05). Age was
not a significant correlate of phenotype membership.

Conclusions. A phenotype characterized by insufficient physical activity and high sedentary behavior represented the majority of study participants. This supports continued development of physical activity interventions targeting minority groups. Study findings also support use of methodological approaches to combine accelerometer and reported data to reduce potential exposure misclassification.

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P315

Beneficial Associations Between Breastfeeding and Cardiopulmonary Fitness: A Life Course Study

Isabel Ferreira, The Univ of Wollongong, Wollongong, Australia; Tracy L Lim, The Univ of Queensland, Brisbane, Australia; Colin A Boreham, Univ Coll Dublin, Dublin, Ireland

In contrast to associations with other cardiometabolic risk factors, the extent to which breastfeeding is associated with cardiorespiratory fitness (CRF) is unclear. Moreover, whether any such association persists throughout the life course has never been investigated before.

We have therefore examined the associations between breastfeeding (yes/no, duration) and CRF as estimated from field and laboratory tests and expressed by the level of VO$_2$max from late childhood, through adolescence to young adulthood in 892 (50.8% female) participants in the Northern Ireland Young Hearts Project. This is a population-based cohort study conducted in a region with very low rates of breastfeeding within the UK and the western world.

Longitudinal data were analyzed with weighted generalized estimating equations, to correct estimates for selective attrition bias (with inverse probability of attrition weights). All estimates were adjusted for the participants age, sex, socio-economic status and important perinatal confounders (birthweight z-scores, gestational age, maternal age and parity, and mode of delivery).

Participants’ mean levels of CRF were 45.6±4.9, 43.9±6.9 and 32.8±9.7 mL/kg/min at the ages of 12, 15 and 22 years, respectively. On average, and as compared with participants who were never breastfed (n=746), those who were breastfed (n=146) had significantly higher levels of CRF, from childhood to adulthood: +1.23 mL/min/kg (95%CI: 0.22, 2.24). Further adjustments for potential mediators, i.e. participants’ lifestyle risk factors (physical activity, smoking alcohol and dietary habits) and body size (height) and composition (fat and fat-free masses) during growth, did not appreciably attenuate this association: 1.14 mL/min/kg (95%CI: 0.29, 1.99). Analyses by duration of breastfeeding did not reveal increasing benefits with increasing duration, however: +1.10 and...
+1.20 mL/kg/min if <=3 and >3 months vs. none, respectively. There were no significant interactions between breastfeeding and participants’ sex or age at the time of CRF assessments, indicating that the decreases in CRF were similar across the different breastfeeding groups, with those who were not breastfed displaying consistently lower levels throughout the longitudinal period. Finally, those who were breastfed had lower lifelong risk of poor CRF as defined according to age and sex-specific reference values of VO₂max: RR=0.70 (0.49, 0.97) and RR=0.73 (0.51, 0.99) in models adjusted for confounders and potential mediators, respectively.

In conclusion, breastfeeding may have lifelong beneficial effects on CRF and thereby cardiovascular health. These findings may have important public health and clinical implications and should reinforce breastfeeding promotion policies, particularly where uptake rates remain low. The mechanisms through which breastfeeding affect CRF need to be further explored though.

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P316

A Longitudinal Assessment of Exercise Participation From Mid- to Late-Life: The Atherosclerosis Risk in Communities (ARIC) Study

Samantha Schilsky, Univ of North Carolina, Chapel Hill, NC; Priya Palta, Columbia Univ, New York, NY; Anna Porter, The Univ of Southern Mississippi, Hattiesburg, MS; Gerardo Heiss, Kelly Evenson, Univ of North Carolina, Chapel Hill, NC

**Background:** Physical activity is a modifiable behavior with cumulative health benefits across the lifespan. Most studies of adult exercise patterns have been cross-sectional and limited to non-US populations. Describing longitudinal changes in exercise from mid- to late-life can provide insight into targeted exercise recommendations for middle-aged and older adults. **Objective:** In the biracial ARIC Study (n=15792), we report trends in the type and duration of exercise among adults aged 45-64 years who were followed for over 20 years. We further examined exercise patterns in a subset of adults who reported engaging in exercise at each ARIC visit (n=1254). **Methods:** Individuals self-reported type and duration of up to 4 exercises participated in the past year at four visits. Participant’s total minutes/week of exercise was estimated as a composite of the 4 exercises. Type of exercise was categorized as defined in Table 1. Participants were identified as having engaged in <30 minutes or ≥30 minutes/week for each exercise category. **Results:** Overall, 9,866 adults (female n=5,288; Black n=1,874) reported engaging in exercise at baseline (Table 1). Adults who reported exercise participation at all visits (n=1254; female n=658; Black n=163) had, on average, increased and then decreased their exercise duration from visits 1 to 6. Consistently active adults participated in exercises for a longer duration over time, while among the whole cohort, duration decreased. Walking was the most frequently reported exercise overall for the whole and consistently active cohort. The number of consistently active adults who walked for at least 30 minutes/week increased from 704 to 790 at visits 1 and 6, respectively. **Conclusion:** Exercise patterns differed for adults reporting participation in exercise at a minimum at visit 1 compared to consistently active adults. Further exploration of predictors (i.e. retirement or health status) of exercise change should be examined to guide recommendations that aim to optimize energy expenditure in adulthood.
Bidirectional Associations Between Accelerometer-Measured Sedentary Time, Physical Activity, and Weight Over 10 Years in the CARDIA Study

Bethany Barone Gibbs, Univ of Pittsburgh, Pittsburgh, PA; David Aaby, Juned Siddique, Feinberg Sch of Med, Northwestern Univ, Chicago, IL; Jared Reis, Natl Heart, Lung, and Blood Insts, Bethesda, MD; Kara Whitaker, Univ of Iowa, Iowa City, IA; Barbara Sternfeld, Kaiser Permanente Northern California Div of Res, Oakland, CA; Kelley Pettee Gabriel, Univ of Texas Health Science Ctr – Houston Sch of Public Health – Austin Campus, Austin, TX

Introduction: Though a pattern of high sedentary time (ST) with low light-intensity (LPA) and moderate-to-vigorous intensity PA (MVPA) is associated with weight gain, other data suggest excess weight may precede this behavioral profile in the causal pathway.

Objective: To investigate bidirectional associations between activity patterns and weight over 10 years.

Methods: Analysis included 886 CARDIA participants (aged 38-50 years, 62% female, 38% black) with weight and accelerometry (≥4 d with ≥10 hr/d) at the year 20 (ActiGraph 7164; 2005-6) and year 30 (ActiGraph wGT3X-BT; 2015-6) exams. Accelerometer data were harmonized and expressed as counts per minute (cpm) and time-dependent (min/d) intensity categories (ST, LPA, MVPA). Linear regression models were constructed to estimate adjusted associations of baseline (Y20) activity with 10-y change in weight and vice versa. Model 2 further adjusted for concurrent 10-y change in the independent variable. When intensity categories were the independent variables, regression coefficients estimated the effect of replacing ST with LPA or MVPA, adjusted for accelerometer wear time.

Results: Over the 10-y follow-up, weight increased by a mean 2.55 ± 8.05 kg; mean total activity (cpm) decreased by -50 ± 153 cpm. Higher baseline cpm and MVPA were associated with a reduced 10-y weight gain (Model 1); further adjustment for concurrent changes in activity (Model 2) strengthened associations such that both baseline LPA and MVPA were each related to reduced 10-y weight gain (Table). Conversely, higher baseline weight was associated with unfavorable changes in activity profile such that ST increased and cpm, LPA, and MVPA decreased over the 10-y follow-up (Model 1); results were similar after adjustment for concurrent weight change (Model 2; Table).

Conclusions: Poor activity profiles and body weight were bidirectionally related. Interventions that work simultaneously to replace ST with LPA and MVPA while also using other methods to address excess weight may be optimal.

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P318

The Association of Physical Activity With Serum Metabolomics: Findings From the Atherosclerosis Risk in Communities (ARIC) Study

Jun Xu, Dept of Epidemiology, Human Genetics, and Environmental Sciences, The Univ of Texas Sch of Public Health, Houston, TX; Kelley P Gabriel, Dept of Epidemiology, Human Genetics, and Environmental Sciences, The Univ of Texas Sch of Public Health; Michael & Susan Dell Ctr for Healthy Living, The Univ of Texas Sch of Public Health, Austin Campus; Dell Medical Sch, Austin, TX; Eric Boerwinkle, Dept of Epidemiology, Human Genetics, and Environmental Sciences, The Univ of Texas Sch of Public Health, Houston, TX

Background

Habitual physical activity can attenuate the risk of developing a variety of non-communicable diseases, however, the underlying mechanisms that explain these benefits remain unclear.

Metabolomics profiling, a tool to provide metabolic phenotypes characterization, holds promise to describe the perturbed energy metabolism associated with physical activity. Identifying a pattern of physical activity related metabolites may provide novel insights into disease etiology.

Methods

Metabolomic profiling was performed in 2,472 African Americans (AAs) and 1,551 European Americans (EAs) from the Atherosclerosis Risk in Communities (ARIC) Study. Two hundred forty five serum metabolites were identified and quantified by liquid and gas chromatography-mass spectrometry. Adjusted linear and ordinal logistic regression models were performed to examine the metabolite associations with reported, leisure-time moderate-to-vigorous intensity physical activity (MVPA), expressed continuously (MET·hr·wk⁻¹) and categorically based on the American Heart Association (AHA) Recommendations for Ideal Physical Activity (ideal, intermediate, or poor). Covariates included: age, gender, race, body mass index, smoking status, and study center. A metabolite risk score (MRS) was constructed using metabolites related to both MVPA and AHA recommendations to evaluate whether it better characterizes the metabolism associated with physical activity.

Results

The mean MVPA was 5.8 MET·hr·wk⁻¹ and 11.1 MET·hr·wk⁻¹ for AAs and EAs respectively, 22.5% and 43.5% met the ideal category of AHA-recommended guideline. We identified eight metabolites that were significantly associated with MVPA (p < 2.04×10⁻⁴, Bonferroni correction), including indole propionate, docosahexaenoate (DHA; 22:6n3), 1-docosahexaenoylglycerophosphocholine (22:6n3), 3-carboxy-4-methyl-5-propyl-2-furanpropanoate (CMPF), N-acetylcarnosine, glycercate, threonate, and stachydrine. All eight metabolites showed individual significance in EAs, but only half (the latter four metabolites) had individual significance in AAs (p < 0.006).
Except DHA and its derivative, the other six MVPA-related metabolites were also associated with AHA recommendations \((p < 2.04 \times 10^{-4})\). One MET-hr-wk\(^{-1}\) increase was associated with 2.18 SD increase of MRS (95% CI: 1.56-2.80), and stratification by race revealed a stronger effect in EAs compared to AAs.

**Conclusion**
A set of metabolites are associated with physical activity in AAs and EAs, including known biomarkers for cardiometabolic diseases, and the MRS was associated with lower heart failure risk. Our findings provide novel insight into the mechanisms underlying the health effects of physical activity.

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**P319**

**Salusin-α is a Novel Biomarker of Cardiovascular Disease Risk in Aging and Exercise Lifestyle: Cross-Sectional and Intervention Study**

**Shumpei Fujie**, Univ of Tsukuba, Tsukuba, Ibaraki, Japan; Research Fellow of Japan Society for the Promotion of Science; University of Missouri; Natsuki Hasegawa, Kiyoshi Sanada, Ritsumeikan Univ, Kusatsu, Shiga, Japan; Takafumi Hamaoka, Tokyo Medical Univ, Shinjuku-ku, Tokyo, Japan; Seiji Maeda, Univ of Tsukuba, Tsukuba, Ibaraki, Japan; Jaume Padilla, Luis A. Martinez-Lemus, Univ of Missouri, Columbia, MO; Motoyuki Iemitsu, Ritsumeikan Univ, Kusatsu, Shiga, Japan

Introduction: A physically active lifestyle leads to reduced risks of cardiovascular disease events in the elderly. A level of circulating salusin-α is a novel biomarker of cardiovascular disease and is associated with increased arterial stiffness. Indeed, circulating levels of salusin-α are lower in patients with coronary arterial disease and hypertension compared to healthy subjects. However, it is unknown whether circulating salusin-α levels are decreased with advanced age and whether circulating salusin-α levels are associated with the reduced cardiovascular disease risks by exercise lifestyle.

**Hypothesis:** We assessed the hypothesis that salusin-α is involved to the changes in cardiovascular disease risk by aging or exercise-promoting healthy lifestyle. Methods: In Experiment 1, 105 healthy subjects (20-80 years old) participated in a cross-sectional study. The subjects were divided into 2 groups: young (under 40 years, n=45) versus middle-age and older (over 40 years, n=60). In Experiment 2, 36 young subjects (young aerobic exercise training group; Young-AT: n=27 and control group; Young-Con: n=9) and 40 healthy middle-age and older subjects (middle-age and older aerobic exercise training group; Middle-age and older-AT: n=26 and control group; Middle-age and older-Con: n=14) volunteered to participate. Subjects in AT groups completed eight weeks of habitual aerobic exercise (60-70% peak oxygen uptake [VO2peak] for 45 min, 3 days/week). We measured serum salusin-α level, carotid-femoral pulse wave velocity (cfPWV), brachial artery systolic (SBP) and diastolic (DBP) blood pressures, common carotid intima-media thickness (ccIMT) and VO2peak. Results: In the cross-sectional study, cfPWV, SBP, DBP and ccIMT were significantly higher and serum salusin-α levels were significantly lower in the middle-age and older adults compared to young adults. Negative correlations were observed between serum salusin-α levels and age \((r=-0.698, P<0.01)\), SBP \((r=-0.458, P<0.01)\), DBP \((r=-0.473, P<0.01)\), cfPWV \((r=-0.479, P<0.01)\), and ccIMT \((r=-0.577, P<0.01)\). In the exercise intervention study, VO2peak and serum salusin-α levels were significantly increased, and cfPWV, SBP and DBP were significantly lowered in the Middle-age and older-AT group compared to the Con group (each P<0.05). Additionally, significant negative correlations between exercise-induced changes in serum
salusin-α levels and cfrPWV ($r=-0.597, P<0.01$), SBP ($r=-0.591, P<0.01$), DBP ($r=-0.442, P<0.05$) or ccIMT ($r=-0.484, P<0.05$) were observed in the Middle-age and older-AT group. There were no significant differences for any of the parameters between Young-AT and Con groups. Conclusions: Changes in salusin-α levels may be a novel biomarker of the increase in cardiovascular disease risks with age and the decrease in cardiovascular disease risks with exercise lifestyle in healthy middle-age and older adults.


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P320

Validation of Smartphone-Recorded Physical Activity for Predicting Cardiorespiratory Fitness

Micah T. Eades, Stephen P. Juraschek, Ernest V. Gervino, Kenneth J. Mukamal, Beth Israel Deaconess Medical Ctr, Brookline, MA

Introduction: While most smartphones can track physical activity, whether this readily available data is associated with clinically meaningful outcomes is unknown. We tested the hypothesis that smartphone-recorded physical activity is associated with cardiorespiratory fitness as measured by peak metabolic equivalents of task (METs) achieved on an exercise stress test. Methods: We recruited 51 Apple iPhone users from the Beth Israel Deaconess Cardiovascular Stress Testing Laboratory between September 2017 - June 2018. We securely downloaded iPhone activity episodes, or epochs, and calculated cumulative steps, distance, and duration; peak speed and duration; and average daily peaks for specific intervals preceding stress tests. Age, gender, height, weight, and METs were obtained from the medical record. In a 70% training set, we used linear regression to determine relationships between individual components of physical activity and METs and to derive a multivariable prediction algorithm for METs. We then tested the best performing algorithm (based on Akaike Information Criterion) in a 30% test set. Results: We collected over 1.1 million activity epochs with a median of 17,103 epochs per participant. Twenty participants were female, median age [interquartile range] was 67 [53, 71] years, and median time preceding stress test [range] was 535 [13, 1,147] days. Average daily peak speed at 180 days most strongly correlated with METs ($R^2=0.44, p<0.001$), and correlation was similar at 3 days ($R^2=0.41, p<0.001$). The best-fitting multivariable model included age, gender, height, weight, and average peak speed at 180 days.

Conclusion: Smartphone-recorded physical activity is readily available and strongly associated with cardiorespiratory fitness, even in an external validation set.


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P321

Leisure-Time Aerobic Physical Activity Reduces the Risk of Diabetes-Related Mortality: NHANES III
Background: Evidence exists to suggest physical activity (PA) reduces risk for diabetes-related mortality (DRM). However, these studies were limited to examining specific modes of PA with only walking, running, and sports participation being consistently related to a reduced risk for DRM. Given the spectrum of leisure-time PA is inclusive of many different modes, it is important to examine this relationship using a more robust measure of PA. Purpose: To examine the relationship between leisure-time moderate-to-vigorous intensity physical activity (MVPA) and the risk of DRM in the Third National Health and Nutrition Examination Survey (1988-1994). Methods: The study sample (n=11,017) included adults, 20-79 years of age, with Mobile Examination Center (MEC) data. An age-standardized physical activity score (PAS) was calculated from the self-reported frequency and intensity of 12 leisure-time aerobic activities. PASs were then used to categorize participants into no activity (PAS = 0) versus any MVPA (PAS > 0). DRM was defined as death from diabetes mellitus, either as the primary cause or as a contributing cause in the National Death Index database. Cox Proportional Hazard models were adjusted for age, sex, race-ethnicity, education, smoking, alcohol consumption, healthy eating index, family history of diabetes, body mass index and diabetes status at the time of the MEC. Race-ethnicity specific models (i.e., non-Hispanic white, non-Hispanic black, and Mexican Americans) were also examined. Results: There was a 68% [HR=0.32 (95% CI 0.23-0.47)] reduction in the risk of DRM, adjusted for age. Following further adjustment for age, race-ethnicity, gender, education, family history of diabetes, body mass index, glycemic status, healthy eating index, smoking status, and alcohol consumption risk estimates were attenuated, but remained statistically significant [HR 0.63 (95% CI 0.43-0.93)]. No interaction between race-ethnicity and MVPA was found. Conclusions: The results of this large, nationally representative prospective study suggest that the accumulation of any volume of MVPA, across a plethora of activities, reduces the risk of DRM.


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P322

Physical Activity Patterns Among Indian Adolescents: Independent and Joint Associations of Gender and Socio-Economic Status

Ilana G. Raskind, Rollins Sch of Public Health, Atlanta, GA; Shailaja S. Patil, Shri. B.M. Patil Medical Coll, BLDE Univ, Vijayapura, India; Michael R. Kramer, Solveig A. Cunningham, Rollins Sch of Public Health, Atlanta, GA

Introduction: The increasing global burden of CVD mortality is primarily attributable to the rising number of deaths in developing countries; India alone accounted for 15% of global CVD deaths in 2016. Little is known about patterns and predictors of physical activity (PA), a key modifiable risk factor for CVD, among Indian adolescents. Existing research has focused on play- and travel-related PA, which do not fully capture adolescent activity, and socio-demographic differences in PA are not well understood. We examined independent and joint associations of gender and socio-economic status (SES) with PA across multiple activity domains.

Hypothesis: We assessed the hypotheses that 1) the types of PA in which adolescents engage will differ by gender and SES, and 2) gender
differences in PA will vary by SES.

**Methods:** We recruited 395 adolescents, ages 13-16, from six schools in Vijayapura, India. We classified public school students as low SES and private school students as high SES. We measured PA using adolescent-reported 24-hour time-use surveys. Activities were categorized into three domains: chores, errands, and jobs; play; and travel. We assigned each activity a metabolic equivalent (MET) value to assess moderate-to-vigorous PA (MVPA). Negative binomial regression modeled the adjusted count of PA minutes per day in each domain, and logistic regression modeled the probability of engaging in ≥60 minutes of MVPA in the prior 24 hours (WHO recommended level for ages 5-17). We assessed additive interaction between gender and SES with the relative excess risk due to interaction (RERI).

**Results:** The proportion of adolescents engaging in ≥60 minutes of MVPA was higher among low SES (79.8% boys, 76.8% girls) than high SES (50.0% boys, 32.3% girls) adolescents. In adjusted models, there were no gender differences in the likelihood of engaging in ≥60 minutes of MVPA. However, girls had twice the PA minutes in chores, errands, and jobs (e(β)=1.98, 95% CI:1.32-2.98), while boys had twice the PA minutes in play (e(β)=2.11, 95% CI:1.23-3.62). Low versus high SES adolescents had higher PA across domains. Additive interaction between gender and SES was present in chores, errands, and jobs: while girls were more active in this domain across SES, gender differences were greater among low SES adolescents (RERI=2.53, 95% CI: 0.31-4.76).

**Conclusions:** A far greater proportion of low SES adolescents engaged in recommended levels of MVPA. While there were no gender differences in the likelihood of engaging in ≥60 minutes of MVPA, girls and boys may accrue different advantages as a result of engaging in substantively different types of PA. Interaction in the chores, errands, and jobs domain suggests that gender hierarchies may emerge in the presence of socio-economic constraints, and lose salience as available resources increase. PA interventions must consider the role of gender- and SES-based facilitators and barriers.

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**Funding Component:**

**P323**

Youth Characteristics Related to Participation in Accelerometer-Measured Physical Activity

**Erin Michelle Delker,** Patricia East, David Wing, Univ of California, San Diego, San Diego, CA; Raquel Burrows, Susanne Reyes, Patricio Peirano, Cecilia Algarin, Univ of Chile, Santiago, Chile; Sheila Gahagan, Univ of California, San Diego, San Diego, CA

**Introduction:** Accelerometer-measured physical activity is considered the ‘gold standard’ of physical activity (PA) measurement. However, previous studies have found that adults in accelerometer studies are more likely to be male, healthier and employed. Little is known about the correlates of participation among youth. We assessed characteristics associated with participation in accelerometer-measured PA among a cohort of healthy Chilean adolescents.

**Methods:** Participants were 670 youth from an ongoing observational study who have been studied since infancy. The adolescent follow-up included measurement of PA with a hip-accelerometer worn for ≥10 hrs/day for ≥5 days or ≥3000 min over a 4-day period. We used multinomial logistic regression to evaluate socioeconomic, lifestyle, and cardiometabolic factors associated with providing sufficient accelerometer data (“Completers”), insufficient data (“Incompleteers”), and not participating (“Non-participants”) in adolescence.

**Results:** The study sample was 47% female and
17 years of age. About 33% (n=223) were Completers, 10% (n=68) were Incompleters, and 57% (n=379) were Non-participants. Completers reported lower neighborhood crime, 50% less cigarette and alcohol use, had healthier diets, healthier cholesterol, and mothers with higher IQs compared to the other two groups (all p<0.05). Incompleters did not significantly differ from Non-participants.

Conclusions: Participants providing complete accelerometer data were not representative of the full sample; they had healthier behaviors and perceived less neighborhood crime. There may be additional unmeasured variables, such as attitudes towards the wearable device, that contributed to participation. Selective participation in studies using accelerometry inhibits generalizability and threatens internal validity when analyzing PA as a predictor of cardiometabolic outcomes. More effort is needed in the design of studies to reduce incomplete and refused participation in accelerometry.


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Funding Component:

P324

Body Mass Index, Walking Pace, and Risk of Coronary Heart Disease: a Mendelian Randomization and Mediation Analysis

Tao Zhou, Dianjianyi Sun, Xiang Li, Mengyu Fan, Yoriko Heianza, Tulane Univ, New Orleans, LA; JoAnn Manson, Harvard T.H. Chan Sch of Public Health, Boston, MA; Lu Qi, Tulane Univ, New Orleans, LA

Introduction Being obese has been related to changes in physical fitness, such as pace-speed declination, which was recently associated with increased coronary heart disease (CHD) risk. The causal link between obesity, walking pace declination, and CHD remains to be established.

Hypothesis High BMI is causally related to slower walking pace, and the relationship between high BMI and CHD that is mediated by altered walking pace.

Methods Data form UK biobank including 408,836 white British participants (enrolled from 2006 to 2010) was used in this study. The usual walking pace was self-reported as slow, steady/average, and brisk, among 352,663 participants with 3,634 CHD cases (enrolled from 2006 to 2010 and followed up to 2016). The causal relation between BMI and walking pace was assessed by Mendelian randomization analysis using 97 BMI related single-nucleotide polymorphisms. A further mediation analysis was performed to assess the association between BMI, walking pace, and incident CHD.

Results and Conclusions In Mendelian randomization analysis performed among 408,836 individuals in the UK Biobank (baseline mean [SD] age, 56.8 [8.0] years; 54.1% (221,196 of 408,836) women), we found a significant causal relationship between genetically instrumented higher BMI and slower walking pace (odds ratio: 1.58, 95% CI: 1.45-1.71, per 1 SD increase in BMI), independent of age, sex, socioeconomic status, alcohol intake, and smoking. In mediation analysis, we found that slow and average walking pace was estimated to mediate 29% and 19% of the association between BMI and incident CHD, respectively, compared with brisk walking pace (p<.001). In conclusion, our results indicate that higher BMI may be causally related to a slower walking pace, which mediates a significant proportion of the association between high BMI and CHD risk.
Disclosures: T. Zhou: None. D. Sun: None. X. Li: None. M. Fan: None. Y. Heianza: None. J. Manson: None. L. Qi: None.

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Funding Component:

**P325**

**Effectiveness of the First Outpatient Pritikin Intensive Cardiac Rehabilitation (ICR) Program**


**Introduction:** ICR has been used for the treatment of patients recovering from a myocardial infarction, cardiac surgery, percutaneous intervention, and/or stable angina. Pritikin ICR is a comprehensive program whereby patients follow a structured diet and exercise program. The first outpatient Pritikin ICR program was implemented at Barnes-Jewish Hospital/Washington University School of Medicine. While patients domiciled at the Pritikin Longevity Center show marked improvements in several cardiovascular disease (CVD) risk factors, the effects of the outpatient Pritikin ICR program are unknown.

**Hypothesis:** Patients who complete 24 sessions of the outpatient Pritikin ICR program will have improvements in several clinically important CVD risk factors, including body mass index (BMI, primary endpoint), adiposity, lipid profiles, and cardiorespiratory fitness.

**Methods:** This observational study of the outpatient Pritikin ICR program was conducted as part of routine clinical care. Patients referred for ICR since 1/1/2017 were invited to participate in assessments at baseline and after completing 24 sessions. ICR was comprised of monitored exercise sessions plus Pritikin education sessions focusing on dietary changes (low-fat, low-sodium, high-fiber foods) and stress management through a series of videos, cooking classes, and workshops. Body composition was assessed using bioelectrical impedance. Fitness was estimated with the 6-minute walk test. Hand grip strength was assessed by dynamometry.

**Results:** 140 ICR patients (28% women; age 68 ± 9 y, mean ± SD) completed baseline and visit 24 assessments over an average of 9.9 weeks. Significant improvements (P<0.001) were observed for BMI (pre 31.0 ± 6.2, post 30.5 ± 6.0 kg/m²), weight (mean ± SD, -1.6 ± 3.0 kg), whole-body fat % (-1.2 ± 2.5), trunk fat % (-1.7 ± 3.3), 6-min walk distance (+37.6 ± 53.6 m), and hand grip strength (+1.22 ± 3.42 kg). Improvements also were observed for waist circumference, total cholesterol, and LDL cholesterol (P<0.05).

**Conclusion:** An outpatient Pritikin ICR program results in significant cardiovascular benefits by reducing adiposity, improving lipid profiles, and enhancing exercise capacity. These favorable results should lead to fewer cardiovascular events.

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P326

Children’s Body Mass Index is Related to Physical Activity Levels in Pre-School Aged Children

Belinda J Parmenter, Alexander Engel, Rachel E Ward, UNSW Australia, Sydney, Australia; Karine Perreault, Univ of Montreal, Quebec, QC, Canada; Abbey Van Capelle, Carolyn Broderick, UNSW Australia, Sydney, Australia

Introduction: One quarter of Australian children are overweight or obese and 71% are on screens for more than 2 hours a day. Current recommendations for physical activity (PA) are for children to complete 60 minutes of moderate to vigorous PA daily, however, only 19% of Australian children adhere to this. With PA levels declining and screen time increasing, we aimed to identify associations between fundamental motor skills (FMS), PA and body mass index (BMI) in preschool aged children.

Hypothesis: We hypothesised that BMI in children is associated with intensity of PA completed, and that children with better FMS would be more PA. Methods: Children aged between 3-5 years were recruited for this study. Height and weight were measured to calculate BMI. BMI was categorised according to national age and gender based percentiles. FMS were tested using the Test of Gross Motor Development-2 and PA levels were assessed using the parent reported Preschool PA Questionnaire. Differences between genders were assessed using analysis of variance. Associations were assessed using multiple linear regressions. Results: Forty-six children enrolled in the study (Mean age 4.0±0.6 years; 72% (33 of 46) boys; mean BMI boys 16.0±1.1; girls 15.8±1.5). According to BMI, 23% (3 of 13) girls and 21% (7 of 33) boys were overweight or obese. Girls (4.5±0.4yrs) were significantly older than boys (3.9±0.6yrs) and were significantly better than boys in locomotor skills (p=0.003); with the hop (p<0.0001) and gallop (p=0.02) being the skills significantly better executed. Performance in these skills was not related to age in either gender. In both genders, BMI was associated with parent reported light PA (Boys (r=0.36; p=0.04); Girls (r=0.57; p=0.02)), and moderate PA levels (Boys (r=0.32; p=0.02); Girls (r=0.59; p=0.02)). In boys, BMI was inversely related to reported levels of vigorous PA (r=-0.41; p=0.009). There was no relationship between BMI and vigorous PA for girls (r=0.07; p=0.42). Conclusion: Boys and girls with higher BMIs are more likely to participate in lower and moderate intensity PA. In boys, the higher the BMI, the lower the level of vigorous PA. More studies are needed to identify whether public health messages should be targeting children based on BMI rather than focussing solely on engaging all children in moderate to vigorous PA. With vigorous intensity PA being associated with higher levels of cardiorespiratory fitness, more research is needed in to whether PA at any intensity is beneficial for cardiometabolic health in children.


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P327

Increased Physical Activity in Adolescents Post-Weight Loss Surgery is Associated with Improvements in CVD-Related Lipid Measures

Paula Holland Price, Alexander M Kaizer, Stephen R Daniels, Thomas Inge, Robert H Eckel, UC Denver Sch of Med, Aurora, CO

Introduction: Severe obesity is increasing in adolescents and is strongly associated with CVD risk. Weight loss surgery (WLS) effectively treats severe obesity and improves CVD-related lipid
measures. Independent of weight loss (WL), physical activity (PA) also improves lipid-related CVD measures and is key to WL maintenance. Longitudinal PA behaviors post-WLS and the impact on CVD-related lipid measures in adolescents is unclear, in part because PA data are largely self-reported. Hypothesis: We assessed the hypothesis that PA improves plasma lipids beyond that associated with active WL in adolescents, post-WLS. Methods: We used objective StepWatch™ PA data from 108 participants of the Teen-LABS bariatric surgery study from baseline to 3 years post-WLS. Inclusion criteria included 1) at least 3 days (1 weekend day and 2 weekdays) of recorded StepWatch™ data, including 6 hours or more of continuously recorded data per day, 2) at least 10 steps per hour, 3) data at baseline and one or more postoperative time points (6 months, 1 year, 2 years and/or 3 years), and 4) matched laboratory and anthropometric data. Participants on lipid lowering therapy were excluded. The primary outcome of interest was absolute change in plasma lipids (TC, TG, HDL-C, LDL-C, and non-HDL-C), holding sex, race, time, % change in iliac waist circumference and procedure constant in a linear regression model with generalized estimating equations assuming an exchangeable working correlation structure. PROC TRAJ in SAS was used to determine the optimal number of group activity trajectories based on step counts at all visits. Results: Two activity groups were identified from PROC TRAJ: less and more active. When considering all mean daily step count data, the overall mean was 4241 (95% CI: 3970, 4513), the more active trajectory mean was 8494 (95% CI: 7596, 9392), and the less active trajectory mean was 3722 (95% CI: 3530, 3915), all well below the recommended 12,000 steps for age. Yet statistically and clinically significant differences by activity trajectory emerged. Greater absolute decreases in LDL-C and non-HDL-C (-15 mg/dL [95% CI: (-28, -2)], p = 0.026 and -15 mg/dL [95% CI: (-28, -1)], p = 0.035), respectively, were associated with activity, holding stated co-variables constant. Activity was also associated with greater percentages of TG, LDL-C and non-HDL-C values being within acceptable ranges, by 2011 NIHBL Integrated Criteria, at 2 years, (TG, 83% vs 70%; LDL-C, 100% vs 83%; non-HDL-C, 83% vs 70%). Conclusion: In conclusion, greater improvement in CVD-related lipid measures was associated with more activity 2 years post-WLS in adolescents, one year post-active WL. Of great interest, the predominant lipid measure influencing CVD risk post-WLS was not HDL-C, as reported in adults. Importantly, the PA-associated reductions of LDL-C, and non-HDL-C are more strongly associated with improved CVD risk than HDL-C increase.


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P328

Domain-Specific Physical Activity and Blood Pressure in 125,402 Adults: The Lifelines Cohort

Oyuntugs Byambasukh, Harold Snieder, Eva Corpeleijn, Dept of Epidemiology, Univ of Groningen, Univ Medical Ctr Groningen, Groningen, Netherlands

Introduction: Whether all domains of daily-life physical activity are associated with lower blood pressure (BP) and how this association depends on age and weight status remains unclear. Methods: In this population-based Lifelines cohort (N=125,402), moderate-to-vigorous physical activity (MVPA) was assessed by the SQUASH, a validated questionnaire in different domains such as commuting (CPA), leisure-time (LTPA) and occupational PA (OPA). BP was assessed using the last three of ten measurements after 10 minutes rest in supine position. Hypertension was defined as systolic BP (SBP) >=140 mmHg or/and diastolic BP (DBP) >=90 mmHg or/and use of
Antihypertensive medication. The exclusion was previously diagnosed cardiovascular disease. Regression analysis was adjusted for age, gender, education, smoking status, and alcohol consumption. **Results:** CPA and LTPA were inversely associated with BP. Commuting-and-leisure-time MVPA was associated with BP in a dose-dependent manner. Beta-coefficients (95%CI) were -1.55 (-1.94; -1.16), -2.17 (-2.56; -1.78) and finally -2.75 (-3.13; -2.36) mmHg SBP for the low, middle and highest tertile of commuting-and-leisure-time MVPA compared to ‘No MVPA’ as the reference group, respectively. There was no significant association between OPA and the risk of hypertension. Further adjustment for BMI attenuated the associations by 30-50%, but more commuting-and-leisure-time MVPA remained significantly associated with lower BP and risk of hypertension. The association between commuting-and-leisure-time MVPA and SBP was age-dependent. Beta-coefficients (95%CI) for highest tertiles of commuting-and-leisure-time MVPA were -1.25 (-1.73; -0.78) and -3.76 (-5.24; 2.28) in adults <40 and >60 years, respectively. **Conclusion:** Commuting-and-leisure-time MVPA was significantly associated with reduced BP and lower risk of having hypertension to a similar degree over most ages except for a stronger association between commuting-and-leisure-time MVPA and SBP with older ages.

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(Odds Ratio [OR]: 2.07; 95% Confidence Interval [CI]: 1.40, 3.06, and OR: 1.96; 95% CI: (1.15, 3.34), respectively). Individuals seeing people walk every day and every 2-3 days were more likely to engage in high levels of LT walking (OR: 2.79; 95% CI: 2.02, 3.85, and OR: 1.98; 95% CI: (1.28, 3.07), respectively). The direct effects of seeing people walk every day (b=0.06, CI [0.02, 0.11]), every 2-3 days (b=0.07, CI [0.00, 0.14]), and once a week (b=0.11, CI [0.03, 0.18]), on medium levels of LT walking were significant. The direct effects of seeing people walk every day (b=0.10, CI [0.06, 0.13]), and every 2-3 days (b=0.05, CI [0.00, 0.10]) on high levels of LT walking were significant. Indirect effects indicate that neighborhood social cohesion was only a significant mediator of the association between seeing people walk every day on medium levels of LT walking (b=0.004, CI [0.00, 0.01]), accounting for 6% of the total effect of seeing people walk every day on LT walking (b=0.07, CI [0.01,0.14]).

Conclusions: These findings suggest that higher neighborhood social cohesion may account for a portion of the contribution of frequency of seeing people walk within sight of home on LT walking among Latino adults. However, the mediation results suggest that other factors may be more pertinent.


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P330

Excluding Participants With Missing or Incomplete Accelerometry Data: Evaluating the Potential for Bias

Erin Delker, Laura Pampano, John Bellettiere, Univ of California, San Diego, San Diego, CA

BACKGROUND: Investigating the effect of physical activity (PA) on health has been improved with accelerometry. However, accelerometer measurement may increase participant burden, leading some to not wear devices. Previous research suggests that participants who do not wear accelerometers may be less active and have worse health outcomes than those who adhere to measurement protocol. This selection bias may lead to underestimates of the true association between PA and CVD outcomes. Using simulations, we illustrate how the association of meeting WHO PA guidelines and hypertension (HT) might be impacted by missing accelerometer data. METHODS: Based on observed prevalence of PA and HT in an ongoing cohort study, we simulated data with 2000 participants, with 40% not meeting PA guidelines and 10% having HT. We set the “true” association between not meeting PA guidelines and HT at 1.9 (OR=1.9; 95% CI=1.5, 2.5). Then, we simulated scenarios to show the impact of four different patterns of missing accelerometer data: A) Missingness independent of PA and HT; B) Missingness associated with PA only; C) Missingness associated with HT only; D) Missingness associated with PA and HT. For each scenario, we conducted complete cases analyses using simple logistic regression to assess associations between meeting PA guidelines and HT.

RESULTS: Odds ratios (ORs) in Scenarios A, B, and C were unbiased. ORs in Scenario D underestimated the magnitude of the “true” association and were increasingly attenuated as the strength of the relationship between study variables and missingness was increased.

CONCLUSIONS: Accelerometer measurement may result in missing data, which can bias odds ratio estimates if the missingness is associated with both the exposure and outcome, a scenario reported in previous research. Efforts to minimize missing data during study design should be prioritized. Carefully considering the structure of missingness in analyses will inform quantification of potential bias, analytic strategies, and interpretation of findings.
Unfavorable Social Factors Increased the Risk of Future Disability Subsequent to Heart Failure in Elderly Japanese Community Dwellers: The Iwate KENCO Study Group

Shuko Takahashi, Harvard T.H. Chan Sch of Public Health, Boston, MA; Kozo Tanno, Iwate Medical Univ, Shiwa-gun, Japan; Yuki Yonekura, St. Luke’s Intl Univ, Tokyo, Japan; Fumitaka Tanaka, Iwate Medical Univ, Morioka, Japan; Masaki Ohnawa, Morioka Tsunagi Onsen Hosp, Morioka, Japan; Motoyuki Nakamura, Iwate Medical Univ, Morioka, Japan; Toru Kuribayashi, Toshiyuki Onoda, Iwate Univ, Morioka, Japan; Kiyomi Sakata, Iwate Medical Univ, Shiwa-gun, Japan; Makoto Koshiyama, Iwate Health Service Association, Morioka, Japan; Kazuyoshi Itai, Morioka Univ, Takizawa, Japan; Akira Okayama, Res Inst of Strategy for Prevention, Tokyo, Japan

Introduction: The risk factors that contribute to future disability after heart failure (HF) are poorly understood. The aim of this study was to determine the risk factors of future disability subsequent to HF in the general elderly population in Japan.

Hypothesis: We assessed the hypothesis that unfavorable social factors after than traditional cardiovascular risk factors contribute to an increased risk for disability after HF.

Methods: The subjects were community-dwelling elderly individuals aged 65 years or older without a history of cardiovascular diseases. We defined disabled subjects as individuals who had been newly certified by the long-term care insurance (LTCI) system during the observation period. HF was diagnosed according to the Framingham diagnostic criteria. After excluding subjects who received LTCI without HF (n=2,305) and subjects who had already received LTCI prior to HF onset (n=33), we classified the remaining subjects (n=4,644) into 3 groups: event-free (no LTCI and no HF; n=4,548, mean age = 70.1 years at the baseline survey), no LTCI after HF (n=52, mean age = 72.3 years) and LTCI after HF (n=44, mean age = 74.6 years). We determined the multivariate-adjusted odds ratio (OR) for having each risk factor (male gender, age (increment of years), unmarried status, less educational years (<7 years), no job status, smoking, drinking, hypertension, diabetes mellitus and dyslipidemia) in the latter two groups (reference: event-free) using polytomous logistic regression analysis.

Results: The median follow-up period was 10.6 years (49,133 person-years), and the median period [interquartile range] from the incidence of HF to the certification for LTCI was 1.3 [0.3-4.7] years. Significantly associated risk factors were more advanced age (OR [95% confidence intervals]:1.18 [1.10-1.25]), unmarried status (2.29 [1.14-4.63]), less educational years (3.36 [1.72-6.55]) and regular drinking (2.58 [1.13-5.88]) in the group of LTC after HF, while the risk factor was more advanced age (1.08 [1.02-1.15]) in the group of no LTCI after HF.

Conclusion: The results suggested that unfavorable social risk factors such as unmarried status, shorter education period and regular drinking strongly contributed to the higher risk of disability subsequent to HF, while those unfavorable risk factors did not
contribute to the risk of incident HF without LTCI. Preventive measures must be taken to protect elderly individuals with unfavorable social factors from disability after HF via a multidisciplinary approach.


Funding: No

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P332

Weight Cycling is Associated With Poorer Cardiovascular Health Assessed Using AHA’s Life’s Simple 7 in a Diverse Sample of Women Encompassing Different Life Stages

Stephanie S Byun, Natalie A Bello, Ming Liao, Nour Makarem, Brooke Aggarwal, Columbia Univ Irving Medical Ctr, New York, NY

Introduction Prior research has shown weight cycling, the repetitive pattern of weight loss and regain, is associated with increased CVD risk. There is limited evidence on the association of history of weight cycling (HWC) with cardiovascular health (CVH) metrics from the AHA Life’s Simple 7 (LS7). Hypothesis We hypothesized that HWC is associated with poorer CVH in women and that these associations may vary by menopausal status and/or pregnancy history. Methods This was a cross-sectional analysis of 485 women enrolled in the AHA Go Red for Women Strategically Focused Research Network. HWC, defined as losing and gaining ≥ 10 lbs at least once (excluding pregnancy) was self-reported. Participants were given scores of 0 (poor), 1 (moderate) or 2 (high) for each AHA LS7 metric (BMI, BP, total cholesterol, glucose, physical activity, diet and smoking). Metric scores were summed into a composite AHA LS7 CVH score: 0-8 (poor), 9-10 (moderate), 11-14 (high). Logistic regression was used to evaluate associations of HWC with AHA LS7 metrics and composite. Models were stratified by menopausal status and pregnancy history due to a statistically significant multiplicative interaction. Results The majority of women (mean age 37±16y, BMI 26±6 kg/m²), 73%, reported ≥ 1 HWC episode, and 26%, 34% and 40% of women had poor, moderate, and high CVH respectively. HWC was associated with lower odds of meeting the BMI metric or moderate or high AHA LS7 composite score, but not with other CVH metrics (Table). In stratified analyses, HWC was associated with lower odds of having a high AHA LS7 score in both pre- and post-menopausal women, but only in women who had never been pregnant. Conclusion HWC was associated with lower odds of meeting the BMI metric and poorer CVH as assessed by AHA LS7 composite score. Associations were stronger in women with no pregnancy history. These findings suggest that in addition to having a healthy weight, maintaining a consistent body weight may be important for achieving ideal CVH, but they warrant prospective confirmation.


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P333
The Association of Sedentary Time in Obese Adolescents With Asthma

Jacob Hartz, Emily Marie Bucholz, Boston Children’s Hosp, Boston, MA; Tiffany Powell-Wiley, Natl Heart, Lung, and Blood Inst, Bethesda, MD; Sarah de Ferranti, Boston Children’s Hosp, Boston, MA

Introduction

Over the past two decades, both asthma and obesity have increased in prevalence. Evidence suggests that the contemporaneous increase in asthma and obesity may not be coincidental, and that obesity may predispose a person to developing asthma. The mechanism for this relationship is unknown, but persistent, low-grade inflammation may be a key driver. As previous research suggests that increased amounts of sedentary time can lead to inflammation, we examined whether sedentary time was associated with asthma in adolescents with obesity.

Methods

Using NHANES 2003-2006, we evaluated the average number of minutes of daily sedentary time and number of breaks in sedentary time in youth age 6-19 years old with obesity, defined as a body mass index (BMI) ≥95th percentile, with and without asthma. We compared demographic variables, self-reported categories of sedentary time, and objectively measured sedentary time and breaks in sedentary time using an accelerometer. We used multivariate logistic regression analysis to determine associations between the risk of asthma in obese adolescents controlling for accelerometer wear time, gender, age, poverty-to-income ratio, C-reactive protein (CRP) as a marker of inflammation, and tobacco smoke exposure.

Results

We found that among sample of adolescents with obesity, 13.2% had asthma. Objective measures of sedentary time did not differ between obese patients with and without asthma nor did CRP (Table 1). However, self-reported computer time was significantly higher in obese adolescents without asthma.

Conclusions

As in our study, previous studies suggest that sedentary time classified as computer time may not increase the risk of cardiovascular disease as much as sedentary time spent watching television.

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P334

Effectiveness of a Questionnaire-based Survey in Improving Awareness of Rheumatic Heart Disease Among School-aged Children in India

Madhab Ray, Tufts Univ Sch of Med, Boston, MA; Santanu Guha, Kolkata Medical Coll, Kolkata, India; Meghna Ray, Dartmouth Coll, Hanover, NH; Avik Karak, Basabendra Choudhury, Kolkata Medical Coll, Kolkata, India; Haroon Zubair, Brockton Hosp, Brockton, MA; Bipasha Ray, Andover High Sch, Andover, MA; Dakshin Gangadharamurthy, Brockton Hosp, Brockton, MA; Prakash C Hazra, Central Government Health Services, Kolkata, India; Santanu Goswami, Columbia Asia Hosp, Salt Lake City, India; Tara O’Meara, Eion Kelly, Brockton Hosp, Brockton, MA; Harry P Selker, Tufts Univ Sch of Med, Boston, MA; Robert Goldberg, Univ of Massachusetts Medical Sch,
Background:
Rheumatic heart disease (RHD) is prevalent in low income countries, with a regional prevalence in South Asia of 2.2 per 1,000 children aged 10-16 years. Awareness among school children is very important for seeking effective secondary prophylaxis. We studied the current level of awareness in school-aged children and evaluated the effect of a 7-item questionnaire-based survey in improving awareness of RHD. The study was conducted in a rural district of India in August, 2017. The objectives were to assess the level of awareness of RHD and to evaluate the effect of a questionnaire-based survey in improving awareness.

Methods:
The study involved 8,646 students in the age group 10-16 years from 20 schools in Midnapore, India. We carried out a pre-test questionnaire survey, a multimedia presentation on RHD, and a post-test survey that assessed students’ knowledge and awareness of its incidence and prevalence, symptoms and signs, morbidity and mortality, ways to prevent and/or reduce the disease burden, and when to seek medical attention. The data were analyzed to evaluate improvement in the level of awareness by this intervention using a 29-point scoring system in 7 domains. Regression analysis was performed to identify the factors that may enhance awareness.

Results:
Awareness among the school children (mean age 13, 45% boys) was modest. There was a significant improvement in their knowledge after the intervention with the survey questionnaire and the presentation by the study team (Table). Regression analysis showed female sex and higher grade in school were major determinants for improvement of the knowledge level by this intervention (p < 0.05 without any significant interaction noted between sex and grades in school).

Conclusions: Current awareness among children about RHD is modest. A school-based intervention by administration of a survey questionnaire and presentation can help in improving the awareness about RHD and hopefully promote secondary prophylaxis to reduce the morbidity and mortality from the disease.

Table: Improvement in students’ awareness of RHD after the survey

<table>
<thead>
<tr>
<th>Domain</th>
<th>Minimum Possible Score</th>
<th>Pre-intervention Mean</th>
<th>Post-intervention Mean</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence</td>
<td>4</td>
<td>1.81</td>
<td>2.88</td>
<td>40%</td>
</tr>
<tr>
<td>Nature of the disease</td>
<td>4</td>
<td>1.11</td>
<td>1.61</td>
<td>40%</td>
</tr>
<tr>
<td>Symptoms</td>
<td>5</td>
<td>1.71</td>
<td>2.22</td>
<td>28%</td>
</tr>
<tr>
<td>Determinants</td>
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<td>1.87</td>
<td>2.21</td>
<td>18%</td>
</tr>
<tr>
<td>Treatment options</td>
<td>4</td>
<td>1.91</td>
<td>2.39</td>
<td>25%</td>
</tr>
<tr>
<td>Impact of the disease</td>
<td>4</td>
<td>2.16</td>
<td>2.57</td>
<td>18%</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>4</td>
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<td>2.84</td>
<td>7%</td>
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<tr>
<td>Total</td>
<td>29</td>
<td>10.49</td>
<td>12.06</td>
<td>17.1%</td>
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</table>


Funding: No

Funding Component:

P335

Greater Frequency of Olive Oil Consumption is Associated with Lower Platelet Activation in Obesity

Healthy lifestyle behaviors, including maintenance of normal weight, are associated with lower risk of atherothrombotic events. In the general population, consumption of olive oil and a Mediterranean diet are associated with reduced risk of cardiovascular disease (CVD). However, less is known about how this affects individuals with obesity. We investigated whether olive oil intake is associated with reduced platelet activation in a cohort of obese, non-smoking, non-diabetic subjects without known CVD. As part of a larger prospective study of platelet function in obesity, we assessed platelet activation (surface P-selectin and PAC1 MFI) with and without agonist (0.025U thrombin, 0.1uM ADP, 0.4uM epinephrine) exposure via flow cytometry. Food frequency surveys were used to estimate diet composition. Subjects were stratified by food intake frequency and platelet activation was compared using ANOVA, with post-hoc independent samples t-testing. Among 63 subjects, the mean age was 32.2 ± 8.0 years and BMI 44.1 ± 8.5 kg/m². Olive oil intake frequency was stratified into 3 groups: ≤ 1 time/wk, n=21; 1-3 times/wk, n=18; ≥ 4 times/wk, n=24. The groups did not differ by age, weight, BMI, waist and hip circumferences, platelet count or mean platelet volume. Subjects with more frequent olive oil intake showed lower platelet activation to agonists than those consuming olive oil ≤ 1 time/wk (Figure). Non-agonized platelet activity did not differ significantly by olive oil intake frequency. Notably, we did not observe associations between platelet activity and consumption of red meat, eggs, butter, or margarine. In metabolically healthy obese individuals, more frequent olive oil intake is associated with suppressed platelet activation. We hypothesize that phenolic compounds in olive oil may alter platelet membrane phospholipid content, making platelets less susceptible to activation. For obese individuals, olive oil intake may lower risk of cardiovascular events.


Funding: No

Funding Component:

P336

Predictors of High Intensity Statin Initiation for Primary Prevention in Veterans With Familial Hypercholesterolemia Phenotype

Saadia Qazi, Brigham and Women’s Hosp, Boston, MA; Laura M. Tarko, Yuk-Lam Ho, Boston Veterans Health Admin, Boston, MA; Ariela R Orkaby, Brigham and Women’s Hosp, Boston, MA; Yan V Sun, Emory Univ Sch of Med, Atlanta, GA; Themistocles L Assimes, Stanford Univ Sch of Med, Stanford, CA; David R Gagnon, Kelly Cho, Luc Djousse, J. Michael Gaziano, Christopher J O’Donnell, Boston Veterans Health Admin, Boston, MA; Peter W Wilson, Emory Univ Sch of Med, Atlanta, GA

Introduction:
Familial hypercholesterolemia (FH) phenotype, defined in part by LDL-Cholesterol (LDL-C) ≥190mg/dL, is a strong risk factor for cardiovascular disease (CVD). The 2013 ACC/AHA cholesterol guidelines recommend high intensity statins for primary prevention irrespective of global risk assessment. We sought to determine predictors of high intensity statin initiation in patients with FH phenotype in the Veteran’s Health Administration (VHA).

Methods:
Inclusion criteria consisted of VHA care (2002-2014), age ≥21 years, absence of prevalent CVD, baseline maximum LDL-C ≥190 mg/dL, no prior statin use, and statin initiation within 90 days of outpatient LDL-C measurement. Baseline characteristics were obtained from the electronic health record. We defined baseline LDL-C using quartile cutoffs. High intensity statin definitions were based on the 2013 cholesterol guidelines plus high dose simvastatin when it was available. Multivariable logistic regression models were constructed to determine the odds of high intensity statin initiation versus low or moderate intensity.

Results:
A total of 88,878 Veterans (age=53.7±11.6, men=91%; white race=74%, LDL-C mean=209.5±23.9, Q1=195, median=202, Q3=215) met inclusion criteria. High intensity statin was initiated in 29,533 (33%) of patients. Comorbidities included smoking history (80%), hypertension (39%), diabetes (10%), and chronic kidney disease (3%). Significant predictors were age >40 years, male sex, diabetes, hypertension, black race, smoking, higher baseline LDL-C quartile, and recent calendar year. Veterans with cancer and white race had lower odds of statin initiation.

Conclusion:
Nearly 1/3 of the Veteran population with the FH phenotype was started on high intensity statins. They were more likely to be older, black, smokers, hypertensive, diabetic, and have a higher baseline LDL-C. The odds of high intensity statin initiation increased in recent years, which may partly reflect practice changes concordant with recent cholesterol guidelines.

Table. Predictors of High Intensity Statin Initiation in Veterans with FH Phenotype.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds Ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41-60 vs 21-40 years</td>
<td>1.29 (1.23, 1.35)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>≥61 vs 21-40 years</td>
<td>1.25 (1.19, 1.32)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Gender, Male</td>
<td>1.24 (1.17, 1.30)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black vs white</td>
<td>1.13 (1.09, 1.17)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>All other race vs white</td>
<td>0.95 (0.89, 1.01)</td>
<td>0.11</td>
</tr>
<tr>
<td>Hypertension</td>
<td>1.08 (1.05, 1.12)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Thyroid Disease</td>
<td>0.94 (0.88, 1.01)</td>
<td>0.074</td>
</tr>
<tr>
<td>Kidney Disease</td>
<td>1.04 (0.95, 1.14)</td>
<td>0.37</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.53 (1.46, 1.60)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Cancer</td>
<td>0.82 (0.79, 0.86)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Calendar Year</td>
<td></td>
<td></td>
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<tr>
<td>2005-2006 vs 2002-2004</td>
<td>1.72 (1.64, 1.80)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>2007-2008 vs 2002-2004</td>
<td>2.01 (1.92, 2.10)</td>
<td>&lt;.0001</td>
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<tr>
<td>2009-2010 vs 2002-2004</td>
<td>2.04 (1.95, 2.13)</td>
<td>&lt;.0001</td>
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<tr>
<td>2011-2012 vs 2002-2004</td>
<td>1.35 (1.28, 1.42)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>2013-2014 vs 2002-2004</td>
<td>2.77 (2.64, 2.92)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>LDL-C, mg/dL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDL-C Q2 vs Q1</td>
<td>1.15 (1.10, 1.19)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>LDL-C Q3 vs Q1</td>
<td>1.34 (1.29, 1.40)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>LDL-C Q4 vs Q1</td>
<td>1.93 (1.85, 2.00)</td>
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<tr>
<td>Ever Smoker</td>
<td>1.09 (1.05, 1.13)</td>
<td>&lt;.0001</td>
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</tbody>
</table>


Funding: No

Funding Component:

P337

CardioClick an Innovative Telehealth Approach to Lifestyle Intervention in High Risk South Asians

Vijaya Parameswaran, Kiranbir Josan, Jennifer Winterbottom, Jenny Shearer, Abha Khandelwal, Shiriram Nallamshetty, Rajesh Dash, Fatima Rodriguez, Stanford Univ, Palo Alto, CA

Introduction: Exercise & nutritional intervention programs are effective in lowering cardiovascular events in randomized control trials but success in real world settings may be limited by resource constraints. We describe
the implementation & preliminary effectiveness of a comprehensive telehealth lifestyle approach that provides culturally relevant lifestyle interventions, recognizing the role of acculturative stressors & behavior patterns unique to South Asians. Methods: CardioClick was introduced in the Stanford South Asian Translational Heart Initiative on 11/1/2017 to deliver care via video visits. Patients ages 20-60 were offered enrollment. Those who did not consent were followed in the traditional in-person program. Both programs included a comprehensive risk assessment & personalized treatment plan focused on aggressive risk reduction, with a set of 3 cardiologist & 3 dietitian visits over 6 months. CardioClick patients received a lifestyle questionnaire & satisfaction survey at each visit. Based on responses & online dialog, culturally tailored nutrition, exercise recommendations & resources to address sleep deficiencies & perceived stress, were provided. Results: Out of 110 currently enrolled 23 have completed CardioClick. These patients were similar in age (44 vs 43 years) BMI (27.1 vs 26.7) & cardiovascular risk (ASCVD 4.8 vs 4.5) but had more dietitian visits (3 vs 1), more likely to lose weight 83% (19/23) vs 54% (44/82) & lost more weight (9lbs vs 0.7lbs) compared to traditional program patients. In the CardioClick group QDiabetes score (9.2 to 7.2) & TG/HDL ratio (2.3 to 1.8) dropped. Questionnaire 100% (23/23) & survey 57%(13/23) responses showed improved lifestyle behaviors & patient satisfaction. Conclusion: Early results from a novel telemedicine preventive cardiology program showed improved patient engagement, lifestyle behaviors & cardiometabolic benefits in high risk South Asians.


Funding: No

Funding Component:

P339

30-Year Absolute Risks for Coronary Heart Disease in Individuals With Very Low LDL-C

William Schultz, Hongyan Ning, Amanda Marma-Perak, Matthew Feinstein, Northwestern Memorial Hosp, Chicago, IL; Allan Sniderman, McGill Univ, Montreal, QC, Canada; Jennifer Robinson, Univ of Iowa, Iowa City, IA; Jarett Berry, Univ of Texas Southwestern, Dallas, TX; Donald M Lloyd-Jones, John T Wilkins, Northwestern Memorial Hosp, Chicago, IL

Introduction: It is unclear if individuals with very low mean low-density lipoprotein cholesterol (LDL-C) during midlife experience significant absolute risk (AR) for coronary heart disease (CHD). Hypothesis: Individuals with LDL-C ≤80mg/dL from ages 20-60 years (y) do not develop significant AR for CHD over 30 y of follow-up. Methods: Our objective was to
quantify and compare the 30-year AR for fatal or nonfatal CHD from index ages 20-40 y and 40-60 y in participants (pts) with LDL-C ≤80, 81-130, and >130 mg/dL using data from the Lifetime Risk Pooling Project. We included pts who were free from lipid lowering medications and CHD at baseline. Mean LDL-C was an average of multiple (2-5) fasting LDL-C measurements within 10 years prior to the baseline age. We used a modified Kaplan Meier analysis, adjusted for competing risks of death, to quantify the 30-year CHD AR by LDL-C strata.

**Results:** 3,781 men and 4,995 women were followed for a combined 110,431 person*years and experienced 778 events. Among all pts, tobacco use ranged from 20-40% and hypertension prevalence ranged from 13-40%. Non-lipid risk factor profiles were generally more favorable in the low-LDL-C strata. At index ages 20-40, men and women with LDL-C ≤80mg/dL did not experience risk for CHD over 20 and 25 years, respectively (Figure). A similar pattern was seen in the LDL-C 80-130mg/dL strata. At index ages 40-60, men and women with LDL-C ≤80mg/dL experienced no risk for CHD for 5 to 15 years, respectively. However, both sex groups saw a gradual increase in risk up to 13.7% (95% confidence interval [CI] 1.9-25.4%) for men and 5.2% (95% CI 2.0-8.4%) for women at year 30 of follow-up. **Conclusion:** Young pts with LDL-C ≤80mg/dL had very low CHD risks across midlife despite significant risk factor burden. At older ages, pts with low LDL-C develop modest AR for CHD suggesting adverse lipid changes over time or alternative mediators of CHD in this age group.

Disclosures: **W. Schultz:** None. **H. Ning:** None. **A. Marma-Perak:** None. **M. Feinstein:** None. **A. Sniderman:** None. **J. Robinson:** None. **J. Berry:** None. **D.M. Lloyd-Jones:** None. **J.T. Wilkins:** None.

Funding: No

Funding Component:

**P340**

**Assessment of Vitamin Levels on Atherosclerotic Cardiovascular Disease Risk: A Resident Driven Quality Improvement Initiative**

**Eric Y Chang,** Anam Umar, Elyse S Stevens, Muhammad Bilal, Mohamad Sukkari, Pooja Padigala, Anita Gopalakrishnan, Balsam Elhammali, Nicolas Bakinde, Morehouse Sch of Med, Atlanta, GA

**BACKGROUND:** Hypertension is a significant risk factor for cardiovascular disease. According to the Centers for Disease Control and Prevention (CDC) half of all United States citizens with hypertension (HTN) do not have their blood pressure under control. As such, HTN remains a large public health challenge, especially in patients with other comorbidities such as diabetes or poor nutritional status. Our goal was to assess the correlation between various vitamin levels with both HTN and atherosclerotic cardiovascular disease (ASCVD) risk in diabetic patients in order to identify potential targets for intervention to further decrease ASCVD and HTN risk.

**METHODS:** We obtained data from the medical record data warehouse of a primary care outpatient clinic predominantly run by internal medicine residents within a large safety-net hospital from January to December 2015. Patients with a diagnosis of diabetes mellitus (both type 1 and 2) were identified and electronic medical records were reviewed. ASCVD risk scores were calculated using the American College of Cardiology ASCVD risk
estimator. Linear and logistical regression analyses were performed using SPSS software to assess the correlation between Vitamin B12, Vitamin D, and folic acid levels with both HTN and ASCVD risk.

RESULTS: Our patient population was predominantly African American (93%, 1633 of 1750). ASCVD scores could be calculated for 883 patients (60% female) and 94% (829 of 883) of these patients had elevated ASCVD risk scores ≥7.5. 86% (760 of 883) of patients had a diagnosis of hypertension or were on antihypertensive treatment. However, analyses of Vitamin D (14%, 126 of 883), Vitamin B12 (31%, 273 of 883), and folic acid (18%, 159 of 883) levels did not reveal any statistically significant correlation with HTN or ASCVD risk, even when stratified for different levels of a1c, ASCVD, or categories of HTN. There was however, a non-statistically significant correlation between vitamin D deficiency and HTN across all a1c levels (a1c <7, r=0.767, p=0.08; a1c ≥7 & <10, r=0.703, p=0.11; a1c ≥7, r=0.543, p=0.09)

CONCLUSION: Our mathematical model cannot be used to explain any statistically significant correlation between Vitamin D, Vitamin B12, or folic acid levels with HTN or ASCVD risk in diabetic patients despite the fact that some studies have noted a potential association. This may reflect an inherent difference in our population (predominantly African American) or may be due to the low baseline monitoring rates of these vitamins. Future aims include initiating a targeted educational intervention for residents in the continuity clinic to not only actively monitor these vitamin levels in high risk populations, but to also demonstrate that resident driven intervention is an effective way to modify both HTN and ASCVD risk factors. Further studies are necessary to elucidate the long term relationship between vitamin levels and CVD risk.

Disclosures:  

Funding: No

Funding Component:

P341

Reduction of Insulin Resistance and Carotid Intima-Media Thickness in Older African American Women: A Randomized Comparison of Transcendental Meditation and Health Education

Robert Schneider, Kenneth Walton, Maharishi Univ of Management, Fairfield, IA; Otelio Randall, Howard Univ Medical Ctr, Washington, DC; Carolyn Gaylord-King, Maharishi Univ of Management, Fairfield, IA; Charlie Harris, Clayton State Univ, Morow, GA; Sanford Nidich, Maharishi Univ of Management, Fairfield, IA; Gregory Strayhorn, Morehouse Sch of Med, Atlanta, GA; Maxwell Rainforth, John Salerno, Maharishi Univ of Management, Fairfield, IA; Shichen Xu, Howard Univ Medical Ctr, Washington, DC

Background: High stress level is thought to be a factor in the disproportionate rates of mortality from CHD and stroke in African Americans. Stress-related CVD risk factors such as hyperglycemia, dyslipidemia, obesity, and high blood pressure tend to occur together, and their co-occurrence has been labeled the “insulin-resistance” or “metabolic” syndrome. The Transcendental Meditation (TM) program is reported to prevent or reverse effects of stress and may provide benefits complementary to lifestyle changes based on diet and exercise.

Methods: A total of 200 older African American women (mean age 65.5, range 55-85 y) in Washington DC and Atlanta, GA were randomly allocated to two behavioral treatment groups—the TM program and a diet-exercise health education (HE) program. The following outcomes were tested before and after one-year: carotid intima-media thickness (CIMT), insulin resistance indicated by homeostatic model assessment (HOMA-IR), serum lipids, blood pressure, and overnight urinary cortisol. 

Disclosures:  

Funding: No

Funding Component:

P341

Reduction of Insulin Resistance and Carotid Intima-Media Thickness in Older African American Women: A Randomized Comparison of Transcendental Meditation and Health Education

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Methods: A total of 200 older African American women (mean age 65.5, range 55-85 y) in Washington DC and Atlanta, GA were randomly allocated to two behavioral treatment groups—the TM program and a diet-exercise health education (HE) program. The following outcomes were tested before and after one-year: carotid intima-media thickness (CIMT), insulin resistance indicated by homeostatic model assessment (HOMA-IR), serum lipids, blood pressure, and overnight urinary cortisol.
excretion. Between group and within group changes were analyzed. CIMT change was compared with normative data using t-test for single means.

Results: CIMT declined significantly in both the TM group \(T(1, 71) = -2.25, p < .03\) and the HE group \(T(1, 63) = -2.656, p = .03\) compared to the yearly progression rate from a large normative database. In the TM group, insulin resistance indicated by HOMA-IR decreased compared to the HE group \(F(1, 138) = 4.72, p < .03\). Urinary cortisol excretion (a measure of chronic stress) decreased (statistical trend, \(p < 0.1\)) in each group.

Conclusions: In this randomized trial, we found prevention of CIMT progression in both TM and HE groups compared to national norms. In the TM group, this may relate to the reduction in insulin resistance presented here and to the improved dyslipidemia presented previously. Both TM and HE groups tended to lower cortisol secretion, suggesting that the effects of both approaches may be due to lowered chronic stress, a probable contributor to CIMT and CVD.


Funding: No

Funding Component:

P342

Life’s Simple 7 Among Statin Users and Non-Users at High Cardiovascular Risk. The Polish Norwegian Study-PONS

Georgeta Vaidean, Fairleigh Dickinson Univ, Florham Park, NJ; Marta Manczuk, The Cancer Epidemiology Div, Cancer Ctr and Inst of Oncology, Warsaw, Poland; Sandeep Vansal, Fairleigh Dickinson Univ, Florham Park, NJ

Introduction: Cardiovascular risk reduction requires the pharmacological treatment of hyperlipidemia to be accompanied by the adoption of healthy behaviors. Whether statin users do so, is not clear and both, false reassurance and healthy adherer-phenomena have been theorized. Our objectives were: 1) to compare AHA Life’s Simple 7 (LS7) prevalence in statin users vs. non-users among statin candidates at high cardiovascular risk and 2) to assess LS7 among potential statin users candidates for Ethyl eicosapentaenoic acid (EPA) treatment. Methods: We used cross-sectional, baseline data of 12754 participants, age 45 to 64 years in a community-based cohort study (PONS). Data were collected through structured questionnaires and fasting blood samples. LS7 were defined based on AHA criteria. Statin use was recorded by trained nurses. We defined as high risk those with clinical ASCVD or diabetes, and those with LDL higher than 190 mg/dL. Statin users potential candidates for EPA therapy were defined based on the REDUCE-IT trial entry criteria. Results: There were 2722 (21.3%) individuals at high risk, of which 791 (29.1%) were using statins. Compared to non-users, statin users were older, mean age (SD) 59 (4) vs. 57 (5), more men (37.4% vs. 32.7%), had lower TC, 185.3 (43) vs. 224.7 (48), lower LDL, 105.6 mg/dL (39) vs. 141.5 (46), more obesity, 46.1% vs.39.6%, less controlled blood pressure 5.5 % vs. 5.6%, less optimal plasma glucose, 48.3 % vs. 53.2% and more AHA poor diet, 40.1% vs. 32.7% (all \(p\)-val. less than 0.05). More statin users than non-users (90.6% vs 73.6%) had poor cardiovascular health, with an age- and sex-adjusted OR (95% CI) of 3.2 (2.4-4.2). The prevalence of potential statin users EPA candidates in the full, community-based sample was low (73 individuals, 0.6%); these individuals had poor glucose control (42.5%), high prevalence of obesity (64.4%) and poor AHA diet (32.4%). Conclusion: Statin users had a worse LS7 profile than non-users, with most unhealthy behaviors being poor diet and obesity. In the context of efficacious pharmacological agents, behavioral
cardiovascular health remains an unfulfilled target.

Disclosures:  **G. Vaidean:** None.  **M. Manczuk:** B. Research Grant; Modest; The data collection was supported by a grant from the Polish-Norwegian Research Fund (PNRF-228-AI-1/07).  **S. Vansal:** None.

Funding: No

Funding Component:

**P343**

**Patients With Cardiovascular Disease Are Not Meeting American Heart Association Secondary Prevention Recommendations**

**Paul M Ndunda**, Mohinder Vindhyal, Tabitha Muutu, Univ of Kansas Sch of Med-Wichita, Wichita, KS

**Introduction** In the United States, cardiovascular disease (CVD) is the leading cause of mortality. More than 92 million Americans have one or more types of CVD and 800,000 die from it annually. More than 47% of myocardial infarction survivors and 30% of stroke survivors get recurrent events, and therefore there is need for data on secondary preventive care, if the AHA’s 2020 impact goal is to be achieved. We assessed the hypothesis that patients with CVD were not meeting AHA secondary preventive guidelines, and there was gender and racial disparities in care.  

**Methods** This study is an analysis of the 2017 Behavioral Risk Factor Surveillance System a chronic disease survey conducted by the CDC. The sample included 51,626 subjects with a history of stroke and coronary artery disease. The secondary preventive measures analyzed included: exercise, diet, smoking cessation, alcohol intake, body mass index, use of blood pressure medications in hypertensive patients and the use of aspirin. Gender and racial disparities were analyzed using multiple logistic regression analysis and age, race, education and income were adjusted for in the outcomes.  

**Results** The median age of the study cohort was 69 years (variance=140). White, black and Hispanic patients represented 79.3%, 8.6% and 6.7% respectively. Females comprised 48.5%. Comorbidities included: hypertension (72.8%), dyslipidemia (63.5%), diabetes mellitus (31.5%) and chronic kidney disease (11.5%). Among CVD patients, 57.1% reported ever smoking and 17.4% of them still smoked. Only 39.2% met AHA aerobic exercise guidelines and 12.1% met both the aerobic and muscle strengthening exercise guidelines. Thirty nine percent of CVD patients undertook more than 150 minutes of aerobic exercise and 12% did 1-149 minutes per week. Obesity/overweight was present in 73.8%. Only 67.8% of patients with CVD were using aspirin, 20% were not on any cholesterol medication (not specified whether statin) while among hypertensive patients, 90.1% were on antihypertensive medications. There were major racial and gender disparities in smoking status [women vs men adjusted OR (aOR) 1.23 (1.21 - 1.25), Hispanic vs white aOR 1.71 (1.66 - 1.76)], aspirin [women vs men aOR 0.66 (0.62 - 0.71), Hispanic vs white aOR 0.56(0.47 - 0.58)]. Women were more likely to be on BP medications [women vs men aOR 1.25 (1.22 - 1.29)].  

**Conclusion** Patients with stroke do not meet AHA lifestyle and aspirin recommendations. There are major gender and racial disparities in the use of CVD secondary preventive measures.

Disclosures:  **P.M. Ndunda:** None.  **M. Vindhyal:** None.  **T. Muutu:** None.

Funding: No

Funding Component:

**P344**

**Temporal Trends of Cardiovascular Health Metrics and Population Attributable Risk for Mortality Among 366,270 French adults.**
Bamba Gaye, Maxime Vignac, INSERM U970, Paris, France; Frédérique Thomas, IPC Paris, Paris, France; Lucile Offredo, INSERM U970, Paris, France; Thomas Van Sloten, Cardiovascular Res Inst Maastricht and Dept of Internal Med, Maastricht Univ Medical Ctr., Maastricht, Netherlands; Xavier Jouven, INSERM U970, Paris, France

**Background:** Current time trends of objectively measured cardiovascular health and their relation with population attributable risk for mortality over time in Western Europe are unknown. We aimed to investigate time trends in cardiovascular health metrics and estimate the population attributable risks of these metrics in relation to all-cause mortality in the population at large, as well as in important subgroups.

**Methods:** In this study, we used a community-based sample of 366,270 adults from France who had a standardized examination to assess cardiovascular risk factors between 1992 and 2011 and with outcome surveillance spanning until 2016 (25 years). Temporal trends of cardiovascular health metrics were computed using metrics defined by the American Heart Association: smoking, body mass index, total cholesterol, blood glucose and blood pressure and physical activity. Population attributable fraction for all-cause mortality over 25 years were measure.

**Results:** Mean age was 44.7 (SD 13) years and 38% (138,228) were women. Overall, few participants (≤3.5%) met all 6 ideal cardiovascular health metrics at any timepoint. The prevalence of meeting ≥5 ideal cardiovascular health metrics increased from 6.2% in 1992-1996 to 16.6% in 2007-2011 (P<.001). An improvement in cardiovascular health was observed in all subgroups, i.e. younger (from 7.1% to 18.5%) and older individuals (from 1.2% to 4.2%), men (from 3.9% to 12.2%) and women (from 10.1% to 22.5%), those with low (from 8.6% to 11.6%) and high education status (from 14.0% to 19.5%) and those with (from 4.7% to 14.8%) and without depressive symptoms (from 6.5% to 16.8%). However, the rate of improvement was steepest in the most affluent group in comparison with those with lower socio-economic status. Furthermore, the improvement in overall cardiovascular health plateaued between 2002-2006 and 2007-2011, and the population attributable risks for all-cause mortality remained high over time.

**Conclusions and relevance:** Overall cardiovascular health improved from 1992 until 2011 in French adults from the community who benefited from a free standardized health examination. However, the improvement in cardiovascular health was less strong in those with low socio-economic status as compared to those with a higher socio-economic status. Furthermore, the fraction of all-cause mortality attributable to cardiovascular health remained high throughout the study period.


Funding: No

Funding Component:

**P345**

Change in Cardiovascular Health Metrics Over Time, CVD Events and Total and Cause-Specific Mortality

Bamba Gaye, INSERM U970, Paris, France; Gabriel S Tajeu, Temple Univ | TU · Health Services Admin and Policy, Philadelphia, PA; Lucile Offredo, Maxime Vignac, INSERM U970, Paris, France; Norriona Bai Allen, The Northwestern Univ Feinberg Sch of Med, Chicago, IL; Xavier Jouven, INSERM U970, Paris, France

**Background:** The impact of changes in cardiovascular health (CVH) on cardiovascular disease (CVD) and total and all-cause mortality has yet to be described.

**Methods:** CVH was computed according to
smoking, body mass index, total cholesterol, blood glucose and blood pressure, physical activity and diet. Change in CVH was defined as a point-to-point difference in each metric or the score. We used time-dependent Cox Proportional Hazard models to calculate hazard ratios for all-cause mortality and CVD events among 10,656 adult participants from the ARIC study, aged 44 to 66 years at baseline (1987-1989) and followed up until 2014. Hazard ratios for all-cause mortality and CVD event according to CVH change at the component metrics and an aggregate score level were calculated with Cox Proportional Hazard models with consistently low CVH considered as the reference group.

**Results:** Overall, 17% of the sample improved their overall CVH, while the percentage which maintained a low CVH or decreased CVH was 29% and 21%, respectively. Higher levels of overall CVH over time were associated with a graded decrease in risk in CVD events and all-cause mortality. The hazard ratios for all-cause mortality among participant that decreased their overall CVH from favorable to low or moderate, that increased their CVH from low to moderate or favorable, and had consistently favorable CVH, as compared with the constantly low CVH group, were: 0.47 (95% confidence interval [CI], 0.39 to 0.57), 0.80 (95 CI%, 0.72 to 0.89), and 0.37 (95% CI, 0.30 to 0.46). The risk reductions were of a same magnitude for CVD events. In the adjusted Cox time dependent model, compared with low overall CVH, having moderate or favorable CVH was associated with a decreased risk in mortality: 24% (HR=0.76, 95% CI, 0.72 to 0.80) and 44% (HR=0.56, 95% CI, 0.51 to 0.62), respectively and a decreased risk in CVD 37% (HR=0.63, 95% CI, 0.59 to 0.66) and 56% (HR=0.44, 95% CI, 0.39 to 0.49), respectively.

**Conclusion:** Earlier life stage favorable CVH was associated with lower CVD events and total and cause-specific mortality regardless of CVH change patterns over time. Furthermore, improving CVH is associated with lower CVD event risk and lower total and all-cause mortality. However, we observed an alarming low percentage of overall CVH improvement and a high percentage of maintaining low overall CVH. Understanding the mechanisms underlying CVH change patterns may help to tackle the low prevalence of moderate or optimal CVH.

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**P346**

**High Stress Reasons for Immigration May Increase Risk for Diabetes: The Africans in America Study**

Regine Mugeni, Margrethe F Horlyck - Romanovsky, Jessica Y Aduwo, Sara M Biker, Natl Insts of Health, Bethesda, MD; Thomas Hormenu, Univ of Cape Coast, Cape Coast, Ghana; Stephanie T Chung, Lilian S Mabundo, Christopher W Dubose, David Berrigan, Anne E Sumner, Natl Insts of Health, Bethesda, MD

**Background:** Scant data exists on whether reason for immigration (work, asylum/refugee, study, family reunification and lottery) affects physiologic stress experienced by Africans living in America. It is also uncertain if high stress measured by allostatic load score (ALS), translates into risk for diseases such as diabetes. **Goals:** Working with self-identified healthy African-born blacks enrolled in the Africans in America study (n=147, men 66% (97/147), age 42±10y (mean±SD), BMI 27.6±4.3 kg/m²), we (a) determined whether ALS varies by reason for immigration; (b) examined the relationship of ALS to risk factors for diabetes including insulin resistance and visceral adipose tissue (VAT) volume. **Methods:** A priori it was decided immigration reasons above the median ALS would be defined as high stress and below the median, low stress. ALS was calculated
using 10 variables from 3 domains: cardiac (SBP, DBP, pulse, cholesterol, HDL, homocysteine), metabolic (BMI, A1C, albumin) and immunological (hsCRP). One point was assigned if a variable was determined high-risk range and 0 if not. According to the distribution of the variables in the cohort, high-risk was defined by being in the highest quartile for each variable, except for albumin and HDL, which required the lowest quartile. Diabetes was diagnosed by OGTT, insulin resistance by Matsuda Index and VAT by abdominal CT scan. **Results:** Three reasons for immigration were identified as high stress: work, asylum/refugee and study (Fig). Low stress reasons were: family and lottery (Fig). Mean ALS for high and low stress reasons for immigration were: 2.8±0.2 vs 1.8±0.2, P<0.01. (Fig). DM was diagnosed in 7% (10/147) of participants, but 90% (9/10) of the immigrants with DM had high stress reasons for living in America. ALS was positively correlated with fasting glucose, 2h glucose, insulin resistance and VAT (all P<0.01). **Conclusion:** High stress reasons for immigration were work, asylum/refugee and study. They may be associated with adverse physiologic consequences including diabetes.


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**P347**

**Lower Optimism is Associated With Heart Failure Readmissions**

Gretchen L Wells, Mary Fisher, Gaixin Du, Univ of Kentucky, Lexington, KY

**Introduction:** Heart failure is one of the most common reasons for hospitalizations in the U.S. and within 30 days of discharge, nearly one in four patients have been readmitted. While optimism is associated with favorable cardiovascular outcomes, including incident coronary heart disease events and readmission post coronary artery bypass surgery, no data exist for the role of optimism in heart failure patients.

**Hypothesis:** We assessed the hypothesis that optimism is associated with 30 day hospital readmission in heart failure patients.

**Methods:** Optimism is measured using the revised Life Orientation Test (LOT-R) a brief, well-validated scale of optimism. This test was administered by convenience sampling to hospitalized adult (>18 years) heart failure patients to determine if low LOT-R scores (less optimistic) were associated with 30 day hospital readmission.

**Results:** Patients in the lower quartile of optimism scores (or pessimistic) had a higher rate of all cause 30 day readmission compared with those in the highest quartile (p=0.0290).

**Conclusion:** In a single center series of hospitalized heart failure patients, those patients with low optimism scores had a significantly higher all-cause 30 day readmission rate compared with those in the highest quartile of optimism scores. Optimism is trait-like yet may be modifiable, thus presenting an opportunity for intervention in heart failure.

**Disclosures:** G.L. Wells: None. M. Fisher: None. G. Du: None.
Validation of SGCD (rs2116737) Genotype-Discrimination Interaction as a Determinant of Blood Pressure Variation in the Jackson Heart Study

Leanne Dumeny, Chu Hsiao, Univ of Florida, Gainesville, FL; Adam P. Bress, Univ of Utah, Salt Lake City, UT; Larisa H. Cavallari, Univ of Florida, Gainesville, FL; Dayna A. Johnson, Emory Univ, Atlanta, GA; Connie J. Mulligan, Univ of Florida, Gainesville, FL; Daichi Shimbo, Columbia Univ Medical Ctr, New York, NY

Introduction: Previous anthropological studies have demonstrated the utility of integrating genetic and psychosocial data, such as discrimination, to understand complex phenotypes such as blood pressure (BP). In these studies, including both single nucleotide polymorphisms (SNP) and psychosocial measures in the model only revealed significant SNPs after accounting for gene by social environment interactions. Methods: We sought to externally validate SNPs associated with BP in African Americans (AAs) identified in a study by Quinlan et al. in 2016 that incorporated novel measures of unfair treatment/discrimination and revealed new genes and biological pathways relevant to BP variation. Our validation was done using a larger cohort study of AAs, the Jackson Heart Study (JHS). Systolic and diastolic BP were measured twice in the same visit using a random-zero mercury sphygmomanometer and averaged. During this visit, perceived discrimination was assessed as lifetime occurrence of unfair treatment in nine social domains using the JHS discrimination instrument. Using available GWAS data, 28 significant SNPs were imputed from 1000 Genomes Project Phase 1 (version 3). Our analysis was conducted separately on participants who reported use of BP medications (n= 1532) and those who did not (n=1407). We similarly tested for associations of SNPs with BP using 3 linear regression models adjusting for global ancestry, sex, age, education, BMI, and relatedness. Model 1 tested only the SNPs, model 2 tested the SNPs and discrimination, and model 3 tested an interaction between SNPs and discrimination. Results: JHS participants were 62% female, with a mean age of 55 years, mean BMI of 32, mean systolic BP of 127 and mean diastolic BP of 76. Participants on average experienced unfair treatment in three domains in their lifetime. In participants not on BP medications, we found that rs2116737, in the gene SGCD, achieved Bonferroni-corrected significance (p < 0.004) with systolic BP in a recessive genotype model ($\beta= 11.92; p =2.00\times10^{-4}$) and was only identified through model 3, the gene-discrimination interaction model. No significant findings were seen in patients using BP medications. Conclusions: rs2116737 was validated in the JHS for a gene-discrimination interaction. rs2116737 is an intronic variant in SGCD, a gene that is highly expressed in arterial tissue, suggesting vascular regulation as a possible mechanism behind the interaction. In conclusion, the findings suggest accounting for a gene by social environment interaction can identify new SNPs that deserve further investigation in understanding BP variation.

Mayra L Estrella, Univ of Illinois at Chicago, Chicago, IL; Melissa Lamar, Rush Univ, Chicago, IL; Ramon Durazo-Arvizu, Loyola Univ Chicago, Chicago, IL; Wassim Tarraf, Wayne State Univ, Detroit, MI; Carmen R. Isasi, Albert Einstein Coll of Med, Bronx, NY; Krista M. Perreira, Univ of North Carolina, Chapel Hill, NC; Maria J. Marquine, Univ of California, San Diego, CA; Richard B. Lipton, Albert Einstein Coll of Med, Bronx, NY; Hector M. González, Univ of California, San Diego, CA; Linda C. Gallo, San Diego State Univ, San Diego, CA; Martha L. Daviglus, Univ of Illinois at Chicago, Chicago, IL

Introduction: Evidence suggests that psychosocial factors, e.g., resources and stressors, are associated with cognitive function and risk for dementia in non-Latino Whites and Blacks. Less is known about the associations between psychosocial factors and cognitive function among Hispanics/Latinos, a group at high risk for dementia. **Hypothesis:** Psychosocial resources (ethnic identity, familism, family cohesion, life engagement, optimism, social network embeddedness, and social support) will be positively associated, and stressors (ethnic discrimination, loneliness, and subjective social status) negatively associated with global cognition [GC] and individual test scores for verbal learning, memory, verbal fluency, and processing speed. **Methods:** Data from the parent HCHS/SOL and its SCAS were used (N = 2,792; ages 45-74). Cognitive function was assessed using standardized tests and GC score was derived from individual test scores. Psychosocial factors were self-reported; higher scores indicate greater levels. Cross-sectional associations between each psychosocial factor and cognition were examined using weighted linear regression models adjusted for age, sex, Hispanic/Latino background, income, education, depressive symptoms, field center, high cholesterol, hypertension, diabetes, obesity, smoking, diet quality, and physical activity. **Results:** In final models (see Table 1), ethnic identity, life engagement, and social support were positively associated with GC, and familism and loneliness were negatively associated with GC. Family cohesion, optimism, social network embeddedness, ethnic discrimination, and subjective social status were not associated with GC. **Life engagement and social support** were positively associated with all individual test scores. **Conclusions:** Life engagement and social support may be particularly important psychosocial resources for cognitive health among Hispanics/Latinos. Longitudinal associations and their underlying mechanisms should be explored.


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P350

Psychological Resilience and CVD-related Health Behaviors: a Cross-sectional Analysis of the Women’s Health Initiative Extension Study

Sparkle Springfield, Stanford Univ, Palo Alto, CA

Introduction

Psychological resilience (resilience), defined as the self-reported ability to bounce back from stress by the Brief Resilience Scale (BRS), has been associated with CVD-related health behaviors. However, the evidence is limited in ethnically diverse older populations. This study...
investigates the association between self-reported resilience and CVD-related health behaviors (smoking status, sleep, recreational physical activity, and diet quality) in women aged 62+ years of age.

**Hypothesis**
Higher levels self-reported resilience will be positively associated with CVD-related health behaviors after adjustment for age, race-ethnicity, and stressful life events (SLE).

**Methods and Materials**
A cross-sectional secondary analysis was conducted on 77,395 women aged 62-85+ [African American (N=4475, 5.8%), White (N=69,448, 89.7%), Latina (N=1891, 2.4%), and Asian or Pacific Islander (N=1581, 2.0%)] who enrolled in the second Women’s Health Initiative Extension Study. Resilience was measured by a short version of the Brief Resilience Scale for assessing the Ability to Bounce Back and divided into 3 levels for descriptive analyses (i.e., low, normal, and high resilience). Multiple regression was used to evaluate the association between levels of resilience and each CVD-related health behavior. Smoking status and sleep were modeled as binary while recreational physical activity and diet quality (as measured by the HEI-2005) were modeled as continuous outcomes.

**Results**
Of the 77,395 women, those with high resilience were younger and less likely to have had SLE. African American women were the most likely to self-report high resilience (48.6%; n=2174), followed by White (45.5%; n=31584), and then Asian or Pacific Islander (43.3%; n=684) and Latina women (43.3%; n=819). After controlling for age, race-ethnicity, and SLE, there was a negative association between self-reported resilience and current smoking status (OR=0.92; 95%; CI:0.87-0.97), and a positive association between 7-9 hours of sleep per night (OR=1.20; CI: 1.17-1.22). Linear regression analysis showed a positive association between self-reported resilience and both recreational physical activity (β=0.45; CI: 0.42-0.49) and HEI-2005 (β=0.60; CI: 0.51-0.69).

**Conclusions**
Resilience is associated with better CVD-related health behaviors in older ethnically diverse women. These findings warrant further investigation into whether assessing and potentially intervening to improve resilience could help to increase the effectiveness of lifestyle interventions.

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P351

**Psychological Resilience is Associated With Higher Subjective Well-being Among Adults Living With Chronic Disease**

Kristen M Tecson, Baylor Heart and Vascular Inst, Dallas, TX; Lindsay R Wilkinson, Bethany Smith, Baylor Univ, Waco, TX; Jong M Ko, The Univ of Texas Southwestern Medical Ctr, Dallas, TX

**Introduction:** While living with a chronic disease can be challenging, some studies have shown that psychological resilience is associated with better outcomes. In this study, we aimed to determine the impact of resilience on well-being among adults living with chronic disease. **Hypothesis:** We hypothesized that resilient participants would have higher quality of life, life satisfaction, happiness, and less psychological distress than those with low resilience. **Methods:** Patients who received treatment for a chronic disease within Baylor Scott & White Health (Dallas, TX) and self-identified an informal caregiver, i.e., a nonpaid friend/family member who provides regular care, were eligible for this study. A phone survey was administered from February-May 2017 by the Center for Community Research and Development at Baylor University. We built linear and ordinal logistic regression models to assess the effect of psychological resilience on...
well-being while adjusting for sociodemographic and health covariates.

**Results:** Forty-one participants completed the study. The average age was 66.5 ± 9.5 years and the most common disease was heart failure (16; 39%). Overall, participants had high resilience (median: 4 [quartile 1=3.3, quartile 3=4.7], scale: 1-5), low psychological distress (4 [2, 7], scale: 0-24), good quality of life (8 [5, 9], scale: 0-10), and high life satisfaction (5 ± 1.6, scale: 1-7). In addition, 33 (81%) respondents were pretty/very happy. The effect of resilience was significant in the expected direction in unadjusted analyses. After accounting for potential confounders, the resilience effect lost significance in the model for life satisfaction (b=0.37, p=0.195), trended toward significance for quality of life (b=0.63, p=0.117), and remained highly significant for psychological distress and happiness (b=-1.91, p=0.003, odds ratio=4.71, p=0.004, respectively).

**Conclusion:** In conclusion, psychological resilience may be a resource to preserve well-being for those living with chronic disease.

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P352

**The Yoga-meditation Heart Connection: a Pilot Study Looking to Improve Women’s Heart Health**

Sasha Y De Jesus, Emily Schultz, Rachel M Bond, Lenox Hill, NY, NY

**Introduction:** Stress, anxiety and depression are nontraditional risk factors for cardiovascular disease (CVD) that are more common in women. Yoga and meditation have shown to improve patient’s overall levels of depression, anxiety, and stress, and possibly decrease CVD risk.

**Hypothesis:** We hypothesize that regular, supervised sessions of chair yoga and meditation can be a complementary measure to decrease the level of anxiety, stress and depression in women with or at risk for CVD, and pursue lifestyle modifications.

**Methods:** An anonymous survey was provided to the participants of a weekly complimentary chair yoga/meditation workshop supervised by a trained cardiac yoga therapist. The surveys were distributed on day 1 and on week 24 to assess any changes in their reported level of stress, depression, anxiety and lifestyle.

**Results:** A total of 16 and 10 female participants with or at risk for CVD completed the initial and follow up survey respectively, which included validated screening tools for depression, anxiety and stress. The Patient Health Questionnaire-9 from the initial session to the follow up survey, showed an increase in the score (2.25 vs 3.2 respectively [P = 0.199]). Despite this increased trend, the severity remained within the definition of minimal depression. The mean Generalized Anxiety Disorder-7 went from 7 in the initial visit down to 4.9 (P = 0.138) for the follow up survey (decreased from a definition of mild anxiety to no clinical anxiety). Lastly, the Perceived Stress Score demonstrated a mean reduction from 18.25 to 15.2 (P = 0.106), both remaining as...
moderate perceived stress. Participants also endorsed a trend towards integrating more low saturated fat foods, and 37.5% endorsed a 3-9 lbs weight loss.

**Conclusion:** Although more research and larger studies are yet to be done to demonstrate a definitive benefit in meditation and gentle chair yoga in CVD risk reduction, our pilot study demonstrated a trend towards overall improvement of novel risk factors for CVD, which predominantly affect women. Given the low harm and cost of these measures, they can be done as adjuvants to our standard of care to increase the patient’s overall well being by improving the psychological aspect of their lives which in turn could reflect on their physical health.

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**P353**

**Health-Related Quality of Life and Risk of All-cause and Cardiovascular Hospitalization in a Healthy General Population: Prospective Findings From the Moli-Sani Study**

*Marialaura Bonaccio*, Augusto Di Castelnuovo, Simona Costanzo, Amalia De Curtis, Mariarosaria Persichillo, Maria Benedetta Donati, Giovanni de Gaetano, Licia Iacoviello, IRCCS NEUROMED, Pozzilli, Italy; Moli-Sani Study Investigators

**Introduction:** There is paucity of data on the longitudinal association of health-related quality of life (HRQL) with health outcomes from the general population, and little is known on the pathways of such associations.

**Hypothesis:** We assessed the hypothesis that HRQL would predict risk of total and cardiovascular (CVD) hospitalization in a population-based cohort of healthy subjects, and tested four pathways possibly accounting for such associations. **Methods:** Longitudinal analysis on 16,097 subjects from the general population of the Moli-sani study, Italy (2005-2010), free from CVD, cancer and diabetes. HRQL was assessed by the 36-Item Short Form Health Survey including both mental and physical domains. Behavioural, traditional, inflammatory and novel markers of CVD risk (listed in table) were tested as explanatory factors. First hospital admissions were recorded by direct linkage with hospital discharge forms. Hazard ratios (HR) with 95% confidence interval (95%CI) were calculated by multivariable Cox-regression. **Results:** Over a median follow-up of 7.4 years, 5644 all-cause and 1724 CVD hospital admissions were ascertained. The highest quintile of mental HRQL was associated with 23% (95%CI: 17% to 29%) and 27% (15% to 37%; Table) lower risk of total and CVD hospitalization, respectively, as compared to the lowest. Risk estimates for physical health were 0.59 (0.54-0.63 for Q5 vs Q1) and 0.56 (0.48-0.64) for total and CVD risk of hospital admissions, respectively. Novel biomarkers (listed in table) accounted for the largest, although modest, proportion of the association of HRQL with risk of CVD hospitalization.

**Conclusions:** In a large sample of disease-free subjects, not only higher physical, but also higher mental HRQL is associated with lower risk of total and CVD hospitalizations. Differences in baseline novel biomarkers slightly explain such associations. Our results suggest that HRQL assessment may be useful in stratifying hospitalization risk among a general population of adults.
Introduction: Perceived stress (including work-related stress) is associated with cardiovascular health. We studied the association between work-family conflict and AHA’s ideal cardiovascular health (ICH) score at the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil) baseline. Hypothesis: Individuals with more frequent work-family conflict have worse ICH scores. Methods: We analyzed data from 11,351 active workers, aged 35-74 years. ICH scores were calculated based on the four lifestyle (diet, physical activity, smoking and body-mass index) and three health (blood pressure, fasting plasma glucose and total cholesterol) metrics proposed by the AHA. Work-family conflict was assessed as time and strain-based work interference with family; family interference with work and lack of time for personal care and leisure. We used quasi-Poisson regression models to analyze the association between work-family conflict and ICH scores, with positive relative predicted score differences (rPSD) indicating higher predicted ICH scores. Results: Subjects with frequent lack of time for personal care and leisure had lower global (rPSD: -2.9%; p=0.01) and lifestyle (rPSD: -8.2%; p<0.01) ICH scores but higher health ones (rPSD: +4.8%; p=0.02). After stratifying by sex, the negative association between lack of time for personal care and leisure and global ICH scores remained significant only in women. In addition, women had a negative association between lifestyle ICH scores and both frequent strain-based work interference with family (rPSD: -5.1%; p<0.01) and family interference with work (rPSD: -8.6%; p<0.01). Conclusions: We found significant associations between work-family conflict and ICH scores in this large multicenter sample. Associations between work-family conflict and ICH score (especially lifestyle metrics) were more intense in women.
Religious Attendance, Educational Attainment, and Hypertension. The Brazilian Longitudinal Study of Adult Health (ELSA-Brasil)

Ana C Varella, Isabela M Bensenor, Univ of Sao Paulo, Sao Paulo, Brazil; Rosane Griep, Fundacao Oswaldo Cruz, Sao Paulo, Brazil; Maria-Jesus Fonseca, Fundacao Oswaldo Cruz, Rio de Janeiro, Brazil; Alexandre C Pereira, Paulo A Lotufo, Univ of Sao Paulo, Sao Paulo, Brazil

Introduction: The relationship between the level of religiosity and health-adverse outcomes has been controversial. One reason should be that how "religiosity" is measured or by a self-declaration (meaning more a cultural variable than a manifestation of the spirituality) of by regular religious practices attendance. Several studies pointed out that educational attainment has a close relationship with the practice of religion. In Brazil, the non-practice religious persons have a higher level of formal education than the general population. Therefore, researchers have focused on risk factors, such as hypertension, studying the effect of religious service attendance, besides other religious dimensions, on blood pressure.

Hypothesis: This study has a premise that attending to religious ceremonies are associated with hypertension according to levels of education.

Methods: At baseline of the ELSA-Brasil study (15105 adults aged 35-74 years old), we asked about the frequency of attendance to religious services. Hypertension was defined as systolic or diastolic blood pressures higher than 140/90 mm Hg or under antihypertensive drugs. Educational attainment was categorized as less or more than high school. Logistic regression models were used to obtain odds ratio (OR) and 95% confidence intervals (95%CI) for the association between frequency of attendance and hypertension adjusted for age, sex, race, income, physical activity and salt consumption (estimated by 12-hour urinary sodium excretion). Further, we added variables that are potential mediators of the religion-hypertension association as smoking, alcohol consumption and body-mass index, depending on the level of education.

Results: Three-quarters (76.9%) of the participants reported to be religious (mean age of 51.6 years, 58.7% women; 51.8% white), and 49.8% of them declared religious attendance at least weekly. For those with a higher educational level, no association was found an inverse association between frequent religious service attendance and the presence of hypertension, also concerning sociodemographic variables, and between religious practice attendance and hypertension after adjusting for covariates (OR = 1.10, 95% CI 0.98-1.23). However, for subjects with lower educational attainment, religious attendance was inversely associated with hypertension (OR = 0.71, 95%CI 0.53-0.96), after adjusting for covariates. We did not find differences in each educational attainment strata related to association religious attendance and hypertension when stratified by gender, race, family income, and to be Roman Catholic and non-Roman Catholic.

Conclusion: The effects of religious involvement on hypertension seem to diverge according to socioeconomic status, represented here by educational attainment.


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P356

Association Between Acculturation and Diet Quality Varies by Acculturation Construct and Heritage: Results From the Hispanic Community Health Study/Study on Latinos

Josiemer Mattei, Martha Tamez, Harvard Chan Sch Public Health, Boston, MA; Daniela Sotres-Alvarez, Univ of North Carolina, Chapel Hill, NC;
Introduction: Inconsistencies remain on the reported associations between measures of acculturation and diet quality, particularly among Hispanics/Latinos.

Hypothesis: We hypothesized that associations between acculturation and diet quality would differ according to the acculturation measure used and by country of origin (heritage). Methods: Baseline data were analyzed from 16,275 Hispanic/Latino adults aged 18–74 years enrolled in the population-based Hispanic Community Health Study/Study of Latinos cohort. Dietary intake was assessed with two 24-hour recalls. Diet quality was measured via the Alternate Healthy Eating Index (AHEI; range 0–110: lowest to highest quality and categorized into tertiles). Acculturation questions on language preference, US vs. foreign-born, years living in the US, and the Short Acculturation Scale for Hispanics (SASH) language and social subscales (higher score = more English use or US orientation) were interviewer-administered.

Results: Adjusting for demographic, socioeconomic, and behavioral factors, each acculturation measure (except SASH-social) was independently and inversely associated with AHEI among overall Hispanics/Latinos (i.e. higher US acculturation = lower AHEI). There were significant interactions (at p<0.10) between acculturation measures and heritage, and thus multivariable-adjusted models were stratified by heritage. Analyses by heritage found higher adjusted odds ratios (AOR; 95% CI) for the top tertile (vs. lowest) of AHEI for being foreign-born (vs. US born) in Mexicans [2.36 (1.54, 3.64)] and for each point of the SASH-language subscale in Mexicans [0.79 (0.64, 0.97)] and Puerto Ricans [0.69 (0.50, 0.97)]. Higher AOR for the middle tertile (vs. lowest) of AHEI was noted for foreign-born and living <10 years in the US in Central Americans, while lower AOR was noted for living <10 years in the US in South Americans.

Conclusions: In conclusion, acculturation measures associated with diet quality are specific to Hispanic/Latino heritage and should be carefully selected in diet and health studies.


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P357

Subclinical Hypothyroidism Alters Autonomous Nervous System. The Brazilian Longitudinal Study of Adult Health (ELSA-Brasil)

Rosangela Hoshi, Paulo A Lotufo, Univ of Sao Paulo, Sao Paulo, Brazil; Eduardo Dantas, Federal Univ Espirito Santo, Vitoria, Brazil; Rodrigo Varejao, J.Geraldo Mill, Federal Univ of Espirito Santo, Vitoria, Brazil; Isabela M Bensenor, Univ of Sao Paulo, Sao Paulo, Brazil

Introduction: Lifetime stressful conditions have been related to a higher risk of coronary heart diseases events. One recognized way is related to the disbalance of a parasympathetic and sympathetic system that can be mediated by several humoral factors, including thyroid hormones. Although the role of thyroid hormones on cardiovascular system regulation on the autonomous nervous system was very well-defined decades ago for normal conditions and there is scarce information concern to the
association between subclinical thyroid disorders and the autonomous nervous system. Hypothesis: Subclinical thyroid dysfunctions are associated with autonomic disturbances assessed by the heart rate variability evaluated by linear and nonlinear variables following postural changes. Methods: At baseline of the ELSA-Brasil study (15105 adults aged 35-74 years old), we evaluated the heart variability rate at the supine position for everyone, and sampled 855 participants to repeat a standing measure of the heart rate variability. Subclinical hypothyroidism was defined as thyroid-stimulating hormone >4 IU/ml for people with normal free-thyroxine levels. The cardiac autonomic nervous function was evaluated by linear time and frequency domain analyses (standard deviation of consecutive RRi - SDNN; root mean square of successive differences between adjacent regular R-R intervals - RMSSD; low frequency - LF; high frequency - HF; LF/HF ratio) as well as by nonlinear symbolic dynamics (patterns with no variation - “0V”; patterns with one variation - “1V”; patterns with two variations - 2V). Results: After exclusions, 666 (93.8%) euthyroid and 44 (6.2%) participants with subclinical hypothyroidism were eligible for analyses. At the baseline, supine rest measurement, the “0V” symbolic pattern, which reflects sympathetic modulation, was higher (31.8 vs. 24.2; P= .01) and “2V”, representing parasympathetic activity, was lower than in the euthyroid group (18.0 vs. 25.3; P= .02). Comparing the variation between positions, the “0V” pattern showed a lower delta in subclinical hypothyroidism than in euthyroid subjects (6.8 vs. 14.2%; P= .04). Additionally, it is suggested that a symbolic analysis of heart rate dynamics is an alternative and, possibly, a more sensitive method for cardiac autonomic assessment following standing position in this population. Conclusion: Subclinical hypothyroidism presented lower sympathetic and parasympathetic tonus at rest and a blunted sympathetic response to active postural change, marked by reduced variation in the “0V” of symbolic analysis.


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P358

Association of Antidepressant Medication Type With the Incidence of Cardiovascular Disease in the Atherosclerosis Risk in Communities (ARIC) Study

Zakaria Almuwaqqat, Maan Jokhadar, Emory Univ, Atlanta, GA; Faye Norby, Pamela Lutsey, Div of Epidemiology & Community Health, Sch of Public Health, Univ of Minnesota, Minneapolis, MN; Wesley T O’Neal, Emory Univ, Atlanta, GA; Amanda Seyerle, Eshelman Sch of Pharmacy, Univ of North Carolina, Chapel Hill, NC; Elsayed Z Soliman, Dept of Epidemiology and Prevention, Wake Forest Sch of Med, Winston-Salem, NC, Winston-Salem, NC; Lin Y Chen, Cardiovascular Div, Dept of Med, Univ of Minnesota Medical Sch, Minneapolis, MN; Douglas J Bremner, Emory Univ, Atlanta, GA; Viola Vaccarino, 6.Dept of Epidemiology, Rollins Sch of Public Health, Emory Univ, Atlanta, GA; Amit J Shah, Emory Univ, Atlanta, GA; Alvaro Alonso, 6.Dept of Epidemiology, Rollins Sch of Public Health, Emory Univ, Atlanta, GA

BACKGROUND: Although antidepressant medications (ADM) are effective in treating depression, a well-established cardiovascular risk factor, they are associated with autonomic dysfunction, also linked to the future risk of cardiovascular disease (CVD). It is unclear if a certain type of ADM’s is associated with less CVD risk than others. We hypothesized that selective serotonin reuptake inhibitors (SSRI) are associated with reduced hazards of atrial fibrillation (AF), heart failure (HF), myocardial infarction (MI) and ischemic stroke (IS) as compared to non-SSRI ADM’s.

METHODS: We studied 2027 participants from
the Atherosclerosis Risk in Communities (ARIC) Study (mean age 63 ± 10 years; 29% men; 78% white) who self-reported ADM use during at least one of the five study visits (1987 through 2013). Participants were classified as SSRI users (47%) vs non-SSRI users (53%). Those who never used ADM’s were excluded due to the concern of unmeasured confounding by their underlying depression. CVD events were adjudicated based on hospital records, participant and physician interviews, and death certificates, using validated criteria. Cox regression adjusted for sociodemographic and clinical variables (sex, age, race, center, level of education, cigarette smoking, alcohol use, BMI, use of antihypertensive medications, diabetes, systolic blood pressure, diastolic blood pressure, aspirin, and calendar year of AD initiation) were used to estimate hazard ratios (HR) and 95% confidence intervals (95%CI) of CVD by type of ADM.

RESULTS: Participants were followed up from ADM initiation up to 2016 for a median of 13.5 years. In this sample we identified a total of 329 AF events, 366 HF events, 198 MI events and 134 IS events. In multivariable Cox regression models, SSRI use was not significantly associated with hazards of AF, HF, MI and IS, when compared to non-SSRI ADMs (HR= 1.11, 95%CI 0.88-1.40 for AF; HR= 0.93, 95%CI 0.72-1.20 for HF; HR= 0.91, 95%CI, 0.65-1.27 for MI; and HR= 1.02, 95%CI 0.67-1.56 for IS).

CONCLUSION: In a community-based sample of individuals using ADM’s, ADM class (SSRI vs non-SSRI) was not associated with significantly different risk of incident CVD. These results do not provide evidence supporting the use of a particular ADM over another in relation to CVD risk.


Funding: No
Discrimination, Lifetime Discrimination, and Workplace Discrimination), resulting in a score measuring 0-3 domains of discrimination, and an AL score was created based on a set of 24 biomarkers representing 7 biological systems (including inflammation, lipid metabolism, and cardiovascular, among others).

**Results**—African-Americans had higher pervasive discrimination and AL scores than Whites ($p<0.001$). In models fully-adjusted for demographics and other relevant covariates, race × pervasive discrimination interaction was observed ($p<0.05$). A pervasive discrimination score of 2 vs. 0 was associated with a greater increase in AL among African-Americans ($b=0.32; p<0.001$) compared to Whites ($b=0.18; p<0.001$).

**Conclusions**—African-Americans report more pervasive discrimination than Whites. This pervasive discrimination in turn, has a greater impact on multisystemic physiological dysregulation in African-Americans compared to Whites. Findings suggest that measuring discrimination by combining multiple forms of discriminatory experiences may be particularly important for studying the health effects of discrimination among African-Americans.


Funding: No

Funding Component:

P360

**Blunted Hemodynamic Response to Acute Mental Stress Among African Americans With Coronary Heart Disease**

Shakia T Hardy, Samaah Sullivan, Muhammad Hammadah, Lisa Elon, Lian Li, J. Douglas Bremner, Arshed Quyyumi, Viola Vaccarino, Emory Univ, Atlanta, GA

**Introduction:** Racial differences in cardiovascular disease morbidity and mortality are well established by middle age with African Americans contributing to higher rates of cardiovascular disease. In addition to traditional risk factors, African Americans experience greater exposure to stressful life events. Both an enhanced and a blunted hemodynamic reactivity to acute psychological stress have been associated with worse cardiovascular health status and may contribute to these disparities.

**Methods:** We studied 920 patients with stable coronary artery disease (CAD) and 109 controls without CAD. Systolic blood pressure (SBP), heart rate (HR), and rate-pressure product (RPP) were measured prior to, and following a public speaking stress task. We examined the association between race and hemodynamic reactivity to stress using mixed linear regression models adjusting for cardiovascular disease severity, medication usage and psychosocial, demographic and lifestyle factors.

**Results:** Of the 920 patients (mean age 59 years), 39% were African American. African Americans had a more adverse socioeconomic and cardiometabolic profile (hypertension, diabetes, and body mass index) compared to white Americans. In response to mental stress, African American patients exhibited a lower increase in SBP (23 vs 27 mmHg; $p <.0001$), HR (11 vs 13 beats/minute; $p =0.008$) and RPP (3205 vs 3718 mmHg x beat/min; $p =0.004$) compared to white Americans, after adjusting for demographics, lifestyle and medical risk factors. Among controls (41% African American), there were no significant differences in the hemodynamic reactivity to an exercise stress test by race.

**Conclusions:** African Americans with CAD exhibit a blunted hemodynamic response to mental stress compared to white Americans. Further research is needed to clarify the determinants of such differences and whether they contribute to race disparities in cardiovascular disease risk.
Body Image Dissatisfaction Influences Cardiovascular Health in Overweight and Obese African American Women

Chandrika Manjunath, Sarah Jenkins, Sean Phelan, Carmen Radecki Breitkopf, Sharonne Hayes, Mayo Clinic, Rochester, MN; Lisa Cooper, Johns Hopkins Univ, Baltimore, MD; Christi Patten, LaPrincess Brewer, Mayo Clinic, Rochester, MN

Introduction: African American women are 5 times less likely than white women to meet at least 5 or more ideal cardiovascular health metrics as defined by the American Heart Association Life’s Simple 7 (LS7) components (smoking, diet, physical activity, BMI, blood pressure, total cholesterol, and glucose). There are few studies probing the influence of sociocultural factors, such as body image dissatisfaction (BID), on these disparities. A better understanding of the impact of BID on cardiovascular health could assist in the design of more effective behavior change interventions for African American women.

Hypothesis: We hypothesized that BID would have a negative association with cardiovascular health in overweight and obese African American women.

Methods: We enrolled 32 women (mean age 49 years [SD 12.9]), from 5 predominantly African American churches participating in a larger community-based participatory study (FAITH! App Pilot Study) of a mobile health lifestyle intervention among African American women and men. We conducted a cross-sectional analysis of baseline data to evaluate the association between BID and both cardiovascular health and select psychosocial factors (e.g. motivation for healthy eating, diet self-regulation). A LS7 composite score was calculated as a measure of overall cardiovascular health (range 0-14). The Pulvers scale, consisting of images of women across the BMI spectrum, was used to measure perceived current and goal body size (rating of figures, 1-9; underweight to very obese). A BID score was calculated as the difference between perceived current and desired body image (range -8-8; BID < 0 [desire to be heavier], BID > 0 [desire to be thinner], BID = 0 [no dissatisfaction]). The BID score range for our cohort was 0-4. Thus, we categorized BID as no/low BID (BID score 0-1) or high BID (BID score 2-4).

Results: Twenty-two percent (7/32) of women were overweight (BMI 25-29.9) and 78% (25/32) were obese (BMI ≥ 30). Forty-four percent (14/32) had no/low BID and 56% (18/32) had high BID. Those with high BID were more likely to be obese as compared to no/low BID (94% (17/18) versus 57% (8/14), p=0.03). Although not statistically significant, the mean LS7 composite score was 1 point higher among those with no/low BID, versus high BID (8.83 versus 7.76, p=0.25). Compared to women with high BID, those with no/low BID were more likely to have greater: intrinsic motivation (P=0.01) and integrated regulation for healthy eating (P=0.007), and self-regulation to reduce fat and caloric intake (P=0.01).

Conclusion: Ultimately, although small, our study suggests that African-American women with obesity are more likely to have high BID. High BID was associated with lower motivation and self-regulation, which predict cardiovascular health. BID and other psychosocial factors for behavior change are potential targets for culturally-tailored lifestyle interventions in this group.

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Funding Component:

P362

Race and Gender Differences in the Association Between Experiences of Everyday Discrimination and Arterial Stiffness Among Patients With Coronary Artery Disease

Samantha G Bromfield, Samaah Sullivan, Ryan Saelee, Lisa Elon, Irina Uphoff, Lian Li, Arshed Quyyumi, Viola Vaccarino, Tene T. Lewis, Emory Univ, Atlanta, GA

Introduction: Self-reported experiences of discrimination have been linked to indices of cardiovascular disease (CVD). However most studies have focused on healthy populations. Thus, we examined the association between experiences of everyday discrimination and arterial stiffness (a known correlate of adverse outcomes among clinically ill and healthy populations) among Black and White patients with a history of myocardial infarction (MI).

Hypothesis: We hypothesized that higher reports of discrimination would be associated with greater arterial stiffness; and that associations would be more pronounced among Blacks overall, and Black women in particular, potentially due to a “double-jeopardy” effect.

Methods: Data were from 253 participants (48.6% female, mean age: 50.8 years) who were 6 months post-MI in the Myocardial Infarction and Mental Stress 2 study. Data were collected via self-reported questionnaires, medical chart review, and a clinic visit during which pulse wave velocity was measured noninvasively following a standardized protocol.

Results: Reports of discrimination were highest in Black men and women (p=0.008) and arterial stiffness was greatest in Black and White women (p=0.290). After adjustment for demographics and relevant clinical variables, discrimination was not associated with arterial stiffness in the overall cohort, or among Blacks. However, discrimination was associated with increased arterial stiffness among Black women but not White women, White men, or Black men (Table 1).

Conclusions: In conclusion, despite no apparent association between discrimination and arterial stiffness in the overall study sample, further stratification revealed an association among Black women but not other race-gender groups. These data not only support the double-jeopardy hypothesis, but also suggest the importance of implementing psychosocial interventions and coping strategies into the care of clinically ill Black women.


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P363

Cardiovascular Health as a Mediator of Psychosocial Influences on CVD

Sarah S Singh, Stephanie J Frisbee, Univ of Western Ontario, London, ON, Canada

Background: Negative psychosocial factors, such as high stress and poor social support, are strongly associated with disease outcomes, including CVD. Conceptually, it is plausible that better cardiovascular health (CVH) may blunt the association between psychosocial factors and incident CVD. However, few studies have investigated whether CVH, which includes
biological and behavioral factors, is a potential pathway between psychosocial factors and CVD. **Objective:** To investigate whether the association between CVD and psychosocial factors is fully or partially mediated by CVH.

**Setting:** This study was carried out in a nationally representative sample of Canadian adults aged 20 years and older. **Data and Methods:** This study is a cross-sectional design using data from the Canadian Community Health Survey (CCHS) 2015-2016 database. The CCHS is a nationwide, nationally representative survey that collects information on the health status, health care utilization and health determinants of the Canadian population. The study outcome was CVD, as measured by the self-reported presence of physician-diagnosed heart disease. The potential mediator was individual CVH, defined using the AHA CVH Index (CVHI) and determined using self-reported responses in CCHS. Psychosocial factors included self-reported responses to questions on life stress, work stress, sleep, social support and alcohol and drug use. A structural equation modeling (SEM) approach was then used to explore the mediational role of CVH in the association of CVD with psychosocial factors. Analyses were conducted in MPlus Version 8 software. **Results:** The majority of the population were males (51%), aged 40-60 (37%), with tertiary education (64%) and of the White race (79%). Overall, the mean CVH of the population was 4.5. Results suggested that CVH and all psychosocial factors, except for life stress predicted, CVD. Additionally, all psychosocial factors, except for life stress and drug use, predicted CVH. Standardized coefficients demonstrated that, of all psychosocial factors, work stress had the highest impact on both CVH (std coeff -0.22, p<0.001) and CVD (std coeff -0.07, p<0.0001). Further analyses demonstrated that CVHI partially mediated the association between CVD and work stress (std coeff -0.02, p<0.001), sleep (std coeff -0.002, p<0.001), alcohol use (std coeff -0.009, p<0.001) and social support (std coeff -0.001, p=0.003). None of the associations were fully mediated by CVH. **Conclusion:**

Results indicated that the association between psychosocial factors and CVD was partially mediated by CVH. That is, while better CVH weakened the association between psychosocial factors and CVD, the direct association between psychosocial factors and CVD remained. Further analyses should investigate whether accounting for individual characteristics such as age, sex and race may reveal full mediation through CVH.

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**P364**

**Validity of Self-Reported Cardiovascular Disease Risk From Survey Questions**

**Sue Duval,** Jeremy Van’t Hof, Lyn M Steffen, Russell V Luepker, Univ Minnesota, Minneapolis, MN

Introduction: Simple questionnaires with dichotomous responses evaluating atherosclerotic risk factors are frequently used to assess cardiovascular disease (CVD) risk in research and clinical settings. Such methods are easier and less costly than direct measurements, but the validity of self-reported risk compared to calculated CVD risk is not well studied.

**Hypothesis:** Self-reported history of hypertension, hyperlipidemia, diabetes and smoking will predict measured CVD risk.

**Methods:** Using the ACC/AHA Pooled Cohort Risk Equations (PCE), we calculated 10 year CVD risk from a randomly selected population sample of 9,856 individuals aged 40-79 without a history of CVD in the Minnesota Heart Survey (MHS). Using log-linear regression models, we estimated sex-specific PCE risk from the individual’s self-reported history of 4 dichotomous risk factors; hypertension,
hypercholesterolemia, diabetes, and smoking. Age was included in all models. Model performance was assessed internally using leave-one-out cross-validation.

Results: The median PCE 10 year CVD risk in women was 2.1% (IQR: 0.8%-5.6%), and in men was 6.3% (3.1%–13.0%). Using the newly developed equations, which included only the 4 self-reported risk factors and age, the estimated median risk was 2.2% (0.9%-5.8%) in women, and 6.9% (3.2%-13.1%) in men. The measured and estimated PCE risk using a threshold of 7.5% to categorize low and high risk gave an accuracy of 95% for women and 87% for men. The multivariable model-estimated PCE corresponded closely with the actual PCE (Figure).

Conclusions: Self-reported history of atherosclerotic risk factors may be useful to estimate CVD risk in individuals, avoiding actual measurements.

Figure: Calibration of the internal validation model, with line of identity denoting perfect calibration in women (left) and men (right).

Risk is plotted at deciles of estimated and measured PCE.

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P365

Restless Leg Symptoms Predicts Adverse Cardiovascular Outcomes in Patients Undergoing Cardiac Catheterization

Jeong Hwan Kim, Syed Ali, Tiffany Dong, Ayman Samman Tahhan, Yi-An Ko, Salim Hayek, Ayman Alkhoder, Afif Martini, Mohamad M Gafeer, Arianna Sidoti, Ahsan Khan, Eesha A Zaheer, Martha Lemma, Fahad Choudhary, Muaz Choudhary, Shahla Delawalla, Donald Biwise, Arshed A Quyyumi, Emory Univ, Atlanta, GA

Introduction: The association between restless leg syndrome (RLS) and CV outcomes remains controversial in the general population, and the impact of RLS among patients with coronary artery disease (CAD) is unknown.

Hypothesis: We examined our hypothesis that RLS symptoms would be associated with incident adverse CV outcomes in patients with CAD.

Methods: We inquired about the presence and frequency of RLS symptoms in 3,176 patients enrolled in the Emory Cardiovascular Biobank (mean age 64, 62% male, 23% Black, and 75% with obstructive CAD), who were prospectively followed for death, myocardial infarction (MI), revascularization, and hospitalization for heart failure (HF). Multivariate Cox proportional hazard models were used to examine the association between RLS symptoms and adverse outcomes after adjustment for demographic and clinical risk factors.

Results: Of the total, 914 (28.8%) and 482 (15.2%) patients reported mild (rare or sometimes) and moderate/severe (often to almost always) symptoms of RLS, respectively. Female sex (Odds ratio [OR] 2.11, P<0.001), higher body mass index (OR 1.12 per 5kg/m2, P=0.007), diabetes (OR 1.43, P=0.003), and beta blocker use (OR 1.35, P=0.013) were independently associated with moderate-severe symptoms of RLS compared to no symptoms. During a median 3.2-year follow-up, 991 patients suffered at least 1 adverse event. Those with moderate/severe symptoms had significantly higher adjusted risk of death/MI (Hazard ratio [HR] 1.30 [1.02 - 1.66]), death/MI/revascularization (HR 1.22 [1.02 - 1.45]), and death/MI/revascularization/hospitalization for HF (HR 1.23 [1.04 - 1.45]). Those with mild symptoms had similar risks to those with no symptoms.

Conclusions: Among patients undergoing
cardiac catheterization, moderate or severe symptoms of RLS are associated with significantly higher risk of adverse CV outcomes, independent of traditional risk factors. This is the first study to demonstrate an independent adverse impact of RLS symptoms in CAD patients.


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P366

Pooled Cohort Equation Performance in Primary and Secondary Prevention Subgroups of the Systolic Blood Pressure Intervention Trial (SPRINT)

Timothy B Plante, Larner Coll of Med at the Univ of Vermont, Colchester, VT; Stephen P Juraschek, Beth Israel Deaconess Medical Ctr, Boston, MA; Neil A Zakai, Russell P Tracy, Mary Cushman, Larner Coll of Med at the Univ of Vermont, Colchester, VT

Background: The Pooled Cohort Equation (PCE) estimates 10-y atherosclerotic cardiovascular disease (ASCVD) risk among adults aged 40-79 years without CVD. Recent studies applied the PCE to mixed primary (1°) and secondary (2°) prevention populations to predict risk of future CVD events. However, the PCE is not validated in 2° prevention populations. We studied the impact of prior CVD on PCE performance in a 2° prevention population of the SPRINT trial.

Methods: SPRINT randomized 9,361 adults with hypertension and ≥1 CVD risk factor or prior ASCVD to standard or intensive BP control. Excluding those age >79 years (n=1,158) or missing PCE covariates (n=52), we calculated 10-year ASCVD risk at baseline using the PCE. We assessed PCE discrimination with the C-statistic among all SPRINT participants and among 1° and 2° prevention subgroups. We estimated the hazard ratio (HR) for incident ASCVD events comparing the 2° to the 1° prevention group, controlling for baseline PCE-estimated 10-y risk.

Results: Of the 8,151 included participants, 6,874 (84%) and 1,277 (16%) were in the 1° and 2° prevention groups, respectively. Mean (SD) age was 66 (8) years, 35% were female, 34% were black. Median (IQR) baseline predicted 10-year ASCVD risk in the 1° prevention group was lower than the 2° prevention group (P<0.001; Table). In the 3.3 years of follow-up, ASCVD events occurred more frequently in the 2° prevention group than the 1° prevention group (P<0.001). The C-statistic was 0.618 (95% CI 0.589, 0.646) in the entire analytic population, and was non-significantly higher among the 1° prevention subgroup. Comparing the 2° to 1° prevention population, HR for incident ASCVD events was 2.6 (95% CI 2.1, 3.3) when controlling for baseline PCE-estimated 10-y risk.

Conclusions: Adults with prior ASCVD events have a nearly 3-fold higher risk of subsequent events. This study demonstrates that the PCE underestimates risk of recurrent events in 2° prevention populations and use in mixed populations should be avoided.
Application of Hierarchical Cluster Analysis on Five Risk Factors Scores (RFS) to Estimate Individual Patient Risk in Case Where There is No Official Country Specific RFS: Example From Bosnia and Herzegovina

Enisa Ademović, Sch of Med Univ of Sarajevo, Sarajevo, Bosnia and Herzegovina; Anshul Saxena, Baptist Health South Florida, Miami, FL; Semra Cavaljuga, Sch of Med Univ of Sarajevo, Sarajevo, Bosnia and Herzegovina; Emir Veledar, Baptist Health South Florida, Miami, FL

Objective The accuracy and applicability of various cardiovascular disease (CVD) risk calculators may not be same in different populations. We compared 5 RFS for CVD risk on patients from Bosnia and Herzegovina to explore relations between different RFS and estimate use of their combination. Methods We utilized demographic, medical history, and lipid profile data gathered from patients seen in primary care clinic in 2013. Five RFS namely, 10 year Framingham CHD score, QRISK 2, AHA/ACC ASCVD risk score, Framingham ATP III score, and EU SCORE were calculated using demographic, history of diabetes and hypertension, taking any hypertension medication, and lipid profile variables. Additionally, we entered these scores as dimensions in hierarchical cluster analysis to group people based on their risk of developing CVD. Results There were 1277 patients in this study and majority (65%) were women. The mean (SD) age of the sample was 56.2 (11.4) years. Correlation between these scores are presented in Table 1. We obtained 4 clusters with significant different cluster centers. Clusters were ordered from lowest to highest risk; cluster 1 containing patients with lowest and cluster 4 with highest mean RFS. Cluster centers, which represents mean values for all the RFS are given in Table 2. Conclusion All risk scores performed well in this population. Only EU SCORE correlated less with other RFS. Obtained clusters are more homogenous and were able to classify patients better. This novel method of using calculated RFCs as dimensions in clustering produced very good estimates of patient’s risk of developing CVD by combining several RFS, even in a case where originally RFS were created for and from different population.
Parag Anilkumar Chevli, Muhammad Imtiaz Ahmad, Wake Forest Sch of Med, Winston Salem, NC; Muhammad Ali Anees, Allama Iqbal Medical Coll, Lahore, Pakistan; Elsayed Z. Soliman, Wake Forest Sch of Med, Winston Salem, NC

Introduction: Hypoglycemia has shown to be associated with increased risk of cardiovascular disease (CVD) events in diabetics. Although, very few studies have investigated incident CVD and all-cause mortality with regard to low fasting plasma glucose (FPG) in the population without diabetes. Methods: This analysis included 8497 participants (mean age=44 years, 53% women, 40% whites), free of CVD and diabetes at baseline, from the Third National Health and Nutrition Examination Survey (NHANES-III). Cox proportional hazards analysis, was used to report hazard ratio (HR) and 95% confidence interval (CI) for association of FPG categories (80-99 mg/dl (reference) <80 mg/dl, 100-125 mg/dl and ≥126 mg/dl) at baseline with CVD and all-cause mortality over the median follow-up of 14 years. Results: There were 570(6.7%) CVD and 2101(24.7%) all-cause deaths over the period of 14 years. Compared to referent category, in a model adjusted for age, sex, race, smoking, physical activity, systolic blood pressure, antihypertensive medications, body mass index and total cholesterol, low FPG was associated with significantly increased risk of CVD and all-cause mortality [HR(95% CI): 1.79(1.04-3.08) and 1.35(1.02-1.78) respectively]. This association was stronger among men than women for CVD mortality [HR(95% CI): 4.29(2.35-7.84) vs. 0.40(0.10-1.65) respectively; interaction p-value=0.0002] and all-cause mortality [HR(95% CI): 1.84(1.23-2.75) vs. 1.08(0.74-1.59), respectively; interaction p-value=0.02]. There was no significant association of impaired and diabetic range FPG with CVD mortality, but diabetic range FPG was significantly associated with increased risk of all-cause mortality [HR(95% CI): 1.25(1.04-1.51)]. Conclusion: This analysis from a large, population-based survey revealed that subclinical hypoglycemia in non-diabetic individuals is a strong risk factor for CVD and all-cause mortality. Although, it is unknown whether avoiding hypoglycemia will reduce this risk.

Table: Association of FPG Categories with CVD and All-Cause Mortality

<table>
<thead>
<tr>
<th>Plasma Glucose Categories</th>
<th>CVD Mortality</th>
<th>All-Cause Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Model HR (95% CI)</td>
<td>p-value</td>
</tr>
<tr>
<td>Reference</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80-99 mg/dl</td>
<td>5678(66.0%)</td>
<td>1.79(1.04-3.08)</td>
</tr>
<tr>
<td>&lt;80 mg/dl</td>
<td>1475(17.8%)</td>
<td>1.401(0.86-2.27)</td>
</tr>
<tr>
<td>100-125 mg/dl</td>
<td>2073(24.7%)</td>
<td>1.270(0.90-1.77)</td>
</tr>
<tr>
<td>≥126 mg/dl</td>
<td>2060(6.9%)</td>
<td>1.549(0.93-2.59)</td>
</tr>
</tbody>
</table>

FHR and 95% Confidence interval calculated from Cox proportional hazard analysis. Model adjusted for age, sex, race, smoking, physical activity, BMI, total cholesterol, systolic blood pressure, and antihypertensive medications. FPG, fasting plasma glucose; CVD, cardiovascular disease; BMI, body mass index.


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P369

Coronary Heart Disease and Mortality Following a Breast Cancer Diagnosis

Aixia Guo, Kathleen Zhang, Randi Foraker, Washington Univ in St. Louis, St. Louis, MO

Background: Coronary heart disease (CHD) is a leading cause of death for breast cancer survivors. While cardiotoxic breast cancer treatments are linked with cardiovascular injury and an increased risk of CHD, current risk prediction models for CHD do not consider the effect of cancer treatments and likely underestimate CHD and mortality risk in this population. Methods: We conducted support vector machine, decision tree, and logistic regression models on electronic health record data to evaluate the independent and joint effects of cardiovascular health (CVH) and cancer treatments on post-treatment CHD and all-cause mortality occurring within 10 years among 1934 women diagnosed with breast cancer in 2006 and 2007 at our medical center. CVH was classified as poor, intermediate, or ideal according to 5 factors: smoking, body mass index, blood pressure, glucose/hemoglobin A1c, and cholesterol. We
considered anthracyclines and hormone therapies as cardiotoxic cancer treatments in these analyses. **Results:** Women with ideal CVH scores had a lower risk of CHD (23.7%) and death (14.3%) compared to those with poor CVH scores (61.9% for CHD, 32.5% for death). Women exposed to cancer treatments had a higher risk of CHD (58.9%) and death (37.5%) compared to women who were not exposed (29.1% for CHD, 15.4% for death). Meanwhile, the joint effects of poor CVH and receipt of cardiotoxic cancer treatments conferred a much higher risk of CHD (75.9%) and death (39.5%) compared to women with ideal CVH who did not receive treatments (20.8% for CHD, 11.2% for death). All approaches (Figure 1) demonstrated the highest area under the curve (AUC) for models considering the joint effects of CVH and cancer treatments (range: 0.70-0.75), followed by the independent effects of CVH (range: 0.65-0.66) and the independent effects of cancer treatments (range: 0.59-0.63). **Conclusions:** Cancer treatment data should be considered along with traditional cardiovascular risk factor data in the prediction of CHD and mortality among breast cancer survivors.

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**Funding Component:**

**P370**

**Minor Electrocardiographic Abnormalities and Cardiovascular Mortality**

**Krupal J Hari,** Matthew J. Singleton, Muhammad Imtiaz Ahmad, Elsayed Z. Soliman, Wake Forest Sch of Med, Winston Salem, NC

**Background**- Although minor electrocardiographic (ECG) abnormalities are common in clinical practice, their prognostic significance remains unclear due to inconsistent reports. Such inconsistent reports may be related to the focus on the presence vs. absence of minor ECG abnormalities and ignoring the number of abnormalities. **Hypothesis**- The number of minor abnormalities
is associated with cardiovascular disease (CVD) mortality in a dose-response fashion.

**Methods** - This analysis included 6,467 participants (mean age 59 years, 53% women, 49% non-Hispanic whites) from the NHANES-III who were free of CVD and major ECG abnormalities. ECG abnormalities were defined from digitally recorded and centrally processed standard 12-lead ECGs using the Minnesota Code ECG Classification. Cause of death was identified using the National Death Index. Cox proportional hazards analysis was used to examine the association between baseline minor ECG abnormalities (presence of at least 1 abnormality vs. normal ECG, and presence of 1, or >2 abnormalities vs. normal ECG, separately) with CVD mortality.

**Results** - About 38% (n=2,438) of the participants had at least 1 minor abnormality at baseline. During a median follow-up of 13.9 years, 755 CVD deaths occurred. Compared to normal ECG, presence of minor ECG abnormally was marginally associated with CVD mortality (HR(95%CI): 1.16 (1.00, 134); p = .0045). When the number of abnormalities was taken into account, the association with CVD mortality showed a dose-response relationship. While presence of only 1 minor abnormality was not associated with CVD mortality, presence of > 2 abnormalities was associated with a 39% increased risk. Also, each additional minor ECG abnormality was associated a 13% increased risk of CVD mortality (Table).

**Conclusions** - The number of minor ECG abnormalities, not only their mere presence, should be taken into account to both understand the prognostic significance of these common findings and to enhance the potential role of ECG to identify individuals at risk for CVD.

| Table: Association between Number of Minor ECG Abnormalities and Cardiovascular Mortality |
|---|---|---|---|---|---|
| ECG Abnormalities | Participants & Event Rate | Model 1 | Model 2 | Model 3 |
| | N (%) | (1000 person-years) | HR (95% CI) | HR (95% CI) | HR (95% CI) |
| 1 abnormality (normal ECG) | 4,052 (62.5%) | 7.5 | Reference | Reference | Reference |
| 1 minor ECG Abnormalities | 1,706 (25.7%) | 10.1 | 1.13 (1.89 - 1.31) | 1.09 (1.39 - 1.25) |
| >2 minor ECG Abnormalities | 690 (10.7%) | 16.7 | 1.25 (1.23 - 1.26) | 1.39 (1.13 - 1.78) |
| Per each additional abnormality | 4,057 (100.0%) | 6.9 | 1.01 (1.08 - 1.30) | 1.15 (1.03 - 1.24) |


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P371

**Short-term Repeatability of the Peguero Electrocardiographic Index of Left Ventricular Hypertrophy**

Dominique N Drager, Michelle L Meyer, UNC-Chapel Hill, Chapel Hill, NC; Elsayed Z Soliman, Wake Forest Univ, Winston-Salem, NC; Gerardo Heiss, UNC-Chapel Hill, Chapel Hill, NC

**Background:** Electrocardiographic left ventricular hypertrophy (ECG-LVH) represents preclinical cardiovascular disease and predicts cardiovascular disease and mortality. Current criteria include the Cornell voltage, Sokolow-Lyon, and the newly developed Peguero index \(S_D + SV_4\). While the Peguero index has been shown to have better prognostic prediction compared with current criteria, its short term repeatability remains uncertain. **Objectives:** Characterize the repeatability and minimal detectable change of the Peguero ECG-LVH index. **Methods:** Participants (n=63; mean age 50 years; 31 females) underwent two standardized visits one week apart. At each visit, trained and certified technicians obtained two ECGs following a standardized protocol. The Epidemiological Cardiology Research Center automatically processed the ECGs using GE Marquette GE 12-SL software (GE, Milwaukee, WI) to obtain the Peguero \(S_D + SV_4\) LHV index, defined as the deepest S wave in any single lead \(S_D + SV_4\). We created a dichotomous using the following cut points: >2.3 mV for women and >2.8 mV for men. Random effects, mixed models were used to parse the variance of the index into the between-participant, between-visit, and within-visit components. We then calculated the intra-class correlation coefficient (ICC), Kappa coefficients, and minimal
detectable change (95% confidence) between repeat measures. **Results:** Between-participant variation accounted for 93.58% (262,958 out of 280,985 SD points) of the total variation of the Peguero LVH index, while between-visit variation and within-visit variation were 5.51% (15,480 out of 280,985 SD points) and 0.91% (2,547 out of 280,985 SD points), respectively. The index had an ICC (95% confidence interval) of 0.94 (0.91-0.97) and a minimum detectable change value of 372.16 mV. Within visit Kappas were 0.79 (0.40-1.00) for the first visit and 1.00 (1.00-1.00) for the second visit. Between visit Kappas were 0.77 (0.70-0.84) for the first measurements of each visit and 0.79 (0.72-0.86) for the second measurements of each visit. **Conclusion:** The Peguero LVH index shows excellent repeatability for both within and between visits. The ICC and resulting confidence interval of the continuous index suggests near perfect agreement between groups. The Kappa values also suggest concurrence between groups of the dichotomous index, although the measures are not as precise as the ICC measure. The repeatability of this measure can be used to inform clinical and epidemiological studies and expand research of this novel index of ECG-LVH.

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**Association of Cardiovascular Disease Family History With Major Cardiovascular Risk Factors in the Hispanic Community Health Study/Study of Latinos (HCHS/SOL)**

**Christina G. Hutten,** Shruti Sachdeva, Molly Scannell Bryan, Ramon A. Durazo-Arvizu, Univ of Illinois at Chicago, Chicago, IL; Krista M. Perreira, Univ of North Carolina-Chapel Hill, Chapel Hill, NC; Gregory A. Talavera, Linda C. Gallo, Sheila F. Castaneda, San Diego State Univ, San Diego, CA; Robert J. Ostfeld, Sylvia Smoller, Albert Einstein Coll of Med, Bronx, NY; Maria M. Llabre, Neil Schneiderman, Univ of Miami, Miami, FL; James P. Lash, Martha L. Davilus, Maria Argos, Univ of Illinois at Chicago, Chicago, IL

**Introduction:** Family history (FH) is a well-known risk factor for cardiovascular disease (CVD); however, the association of FH with CVD in Hispanic/Latino populations has not been well investigated. We examined the cross-sectional association of FH of CVD or CVD risk factors with individual CVD risk factors (hypertension, hypercholesterolemia, obesity, diabetes mellitus, and smoking), CVD risk profile, and prevalence of CHD or stroke in the HCHS/SOL.

**Methods:** Baseline data on FH and CVD risk factors from 15,104 HCHS/SOL participants were analyzed. Self-reported first-degree FH of high blood pressure (BP), high cholesterol, diabetes, angina, heart attack, heart failure, rheumatic heart disease, angioplasty/bypass, stroke, aortic aneurysm, and peripheral artery disease was ascertained and categorized as any first-degree FH vs. no FH of each condition. Hypertension, high cholesterol, obesity and diabetes mellitus were ascertained by objective measures and/or medication use; smoking was self-reported. The CVD risk profile was calculated by assigning a score of 0 to 5 based on the number of adverse CVD risk factors. Analysis of CVD risk factors was dichotomized as low (0 and 1 risk factor) vs. high (2+ risk factors). Odds ratios and 95% confidence intervals were derived from logistic regression models, accounting for the complex study design and controlling for multiple covariates. Results: Prevalence of CVD risk factors and risk profile were associated with self-reported FH (see Table). Furthermore, prevalence of CHD was associated with FH of high BP, high cholesterol, diabetes, angina, heart attack, heart failure, and rheumatic heart disease. Personal history of stroke was associated with FH of high BP, angina, and aortic aneurysm.

**Conclusions:** First-degree FH of CVD factors and...
diseases was associated with hypertension, high cholesterol, obesity, diabetes, CHD and stroke among Hispanics/Latinos in HCHS/SOL. Ascertainment of FH should be an integral part of CVD risk assessment in Hispanics/Latinos in the US.


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P373

Estimation of Atherosclerotic Cardiovascular Disease Risk in Veterans

Luc Djousse, Jason L. Vassy, David R. Gagnon, Bing Lu, Yuk-Lam Ho, Lauren Costa, J. Michael Gaziano, Kelly Cho, VA Boston Healthcare System, Boston, MA; Peter W.F. Wilson, Atlanta VA Medical Ctr, Decatur, GA

There are concerns that 2013 ACC/AHA ASCVD pooled risk prediction models are not accurate predictors in contemporary American patient populations, and that these models do not take into account the highly prevalent use of statin therapy or the effects of statins on vascular disease prevention. Using validated phenotyping algorithms, we evaluated the accuracy of the pooled risk model for the development of Hard ASCVD in 1.42 million Veterans (4.3% women, 16.6% black) with mean age 60 years (range 40-79 years) at baseline VA outpatient clinic evaluations in 2002-2004. There were 93,250 Hard ASCVD events over a mean of 8.4 years of follow up. We estimated Hard ASCVD risk using traditional variables (age, sex, race, total cholesterol, HDL cholesterol, diabetes mellitus, systolic blood pressure, blood pressure treatment, and smoking history) employed in the 2013 ACC/AHA ASCVD risk report. Three analytic approaches were undertaken, using 1) published 2013 ACC/AHA prediction equations, 2) 2013 ACC/AHA variables to fit VA-specific Cox regression models for white men, black men, white women, and black women, and 3) model 2 plus baseline statin use. The Harrell’s c-statistics for the models are shown in the table along with the hazard ratios for statins from model 3. Traditional predictor variables were generally statistically significant in all models, and model 1 over predicted absolute risk of Hard ASCVD in VA by approximately 6%, and statin use was associated with up to an 18% reduction in ASCVD risk. In conclusion, these results demonstrate that the pooled ASCVD prediction model performs relatively well in the VA setting, as shown by relatively good c-statistics. The 2013 ACC/AHA over predicted ASCVD risk and statin therapy at baseline was an important determinant of outcomes.


Funding: No
Healthy Lifestyle Factors Are Associated With a Lower Risk of Cardiovascular and Cancer Mortality in Older Men


Background: Cardiovascular disease and cancer are the two leading causes of death in the United States. Although individual healthy lifestyle behaviors have been associated with health benefits in middle-age adults, little is known about these factors and mortality in older adults. Objective: To assess the association between modifiable lifestyle factors and risk of CVD and cancer mortality in older men. Methods: We prospectively studied 8314 men aged 65 years and above from Physicians’ Health Study II. Baseline information on lifestyle factors was self-reported. We assessed healthy lifestyle factors as follows: Not smoking, BMI <25 kg/m2, vigorous exercise for at least 5 days a week, and healthy diet habit (assessed as being in the top 2 quintiles of the alternate healthy eating index-2010). We used COX regression analysis to calculate adjusted hazard ratios with 95% CI for cardiovascular disease (CVD) and cancer mortality. Results: After a mean follow up duration of 9 years, 443 participants died due to cardiovascular disease and 349 died due to cancer. Age adjusted hazard ratios (95% CI) of cancer mortality was 0.73 (0.55-0.96), 0.58 (0.43-0.78), and 0.52 (0.36-0.75) for people with one, two, and 3+ healthy lifestyle factors, respectively, compared to people adhering to zero healthy lifestyle factor. Corresponding values for CVD mortality hazard ratios (95% CI) were 1.01 (0.78-1.32), 0.70 (0.53-0.93), and 0.73 (0.53-1.01), respectively. Conclusion: Adhering to healthy lifestyle behaviors is associated with lower risk of cardiovascular and cancer mortality in older men.


Using a Recalibrated Cardiovascular Disease Risk Score is Not Adequate to Predict Risk of Recurrence Within 3 Years in Australian Survivors of Stroke

David Ung, Dept of Med, Sch of Clinical Sciences at Monash Health, Monash Univ, Clayton, Victoria, Australia; Richard P Gerraty, Dept of Med, Epworth Healthcare, Richmond, Victoria, Australia; Judith Frayne, Dept of Neurology, Alfred Hosp, Melbourne, Victoria, Australia; Muideen T Olaiya, Joosup Kim, Dept of Med, Sch of Clinical Sciences at Monash Health, Monash Univ, Clayton, Victoria, Australia; Velandai K Srikanth, Dept of Med, Sch of Clinical Sciences at Monash Health, Monash Univ, Clayton, Australia; Mark R Nelson, Dept of Epidemiology and Preventative Med, Monash Univ, Clayton, Victoria, Australia; Christopher F Bladin, Dept of Neurosciences, Box Hill Hosp, Box Hill, Victoria, Australia; Amanda G Thrift, Dept of Med, Sch of Clinical Sciences at Monash Health, Monash Univ, Clayton, Victoria, Australia

Background: Prognostic performances of models predicting risk of recurrent events of cardiovascular disease (CVD) are not adequate for use in clinical settings. We aimed to determine whether adapting the Framingham Risk Score (FRS) to an Australian population could effectively predict recurrent
cardiovascular outcomes.

**Methods:** Patients comprised survivors of stroke/TIA who participated in the Shared Team Approach between Nurses and Doctors For Improved Risk factor Management (STAND FIRM) trial (n = 563). We used standardised anthropometric, biochemical and blood pressure data, collected at baseline, to evaluate risk factors for stroke/TIA. Cox proportional hazards regression models were used to determine the risk of recurrence of CVD-related events and deaths within 3 years after stroke/TIA; adjudicated by two independent stroke specialists. Regression estimates were then used to recalculate the coefficients used by the FRS, and performance of the model assessed.

**Results:** In women, the recalibrated FRS model had poor discrimination (C-statistic = 0.634) and appeared to better predict CVD recurrence (AUC = 0.664) than the original FRS model (AUC = 0.598). However in men, the recalibrated FRS model had poor discrimination (C-statistic = 0.604) and prediction of CVD recurrence (AUC = 0.632) similar to the original FRS model (AUC = 0.606).

**Conclusion:** The original FRS and recalibrated FRS models appeared to perform poorly in Australian men and women with stroke. The identification of relevant risk factors, easily measured in a clinical setting, may help clinicians better monitor the risks of their patients and enhance secondary prevention strategies.

Disclosures:  

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**Clinical Use of a Proteomic Cardiovascular Risk Score for Assessing How Personal Risk Assessment Positively Drives Patient Attitudes and Behavior Change**


**Background:** The ACC has outlined a strategic goal where innovation and knowledge optimize cardiovascular care and outcomes. We tested whether sharing with patients a personal 7-protein cardiovascular risk score might motivate them to better adhere to cardiovascular risk reduction measures. **Methods:** The 7-protein risk score (SOMAscan® CVD Secondary Risk Panel, SomaLogic) provides % risk by year for experiencing a cardiovascular event up to 5 years. Patients with stable coronary heart disease received a baseline lifestyle and behavior survey, chart abstraction, and blood draw for the 7-protein risk score. Results were shared with the patient by their physician. One month after receiving the panel results, patients were surveyed on the overall impact of the panel on health, lifestyle, and medication changes. **Results:** Among the 138 patients, 23.9% had ≥ 20% predicted risk of a cardiovascular event in 5 years. Higher risk patients reported higher rates of desirable lifestyle changes, including healthier diet (Figure 1). Lower risk patients stated they would maintain their lifestyle to remain healthy. **Conclusions:** Patients presented with their personal 7-protein cardiovascular risk score were motivated to improve their lifestyle and adherence to medications. The additional motivation from the test results, if sustained long-term, may translate into improved outcomes in patients with coronary heart disease.
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P378

A Novel Risk Prediction Score for Incident Heart Failure Among Patients With Diabetes

Matthew W Segar, Kershaw V Patel, Jarett D Berry, Ambarish Pandey, Univ of Texas Southwestern Medical Ctr, Dallas, TX

Introduction
Diabetes is a well-established risk factor for heart failure (HF). However, risk prediction models for incident HF in patients with diabetes are lacking. Accordingly, we aim to develop a novel risk-prediction model for HF in a diabetes cohort using a hybrid machine learning method for variable selection and CoxPH approach for risk prediction.

Methods
We used data from the ACCORD trial that included patients with prevalent diabetes at baseline and had adjudicated HF events on follow up. The data was divided in to 80/20% training and testing (n = 6,896/1,725, respectively) and 152 baseline variables were included. A random survival forest (RSF) of 1000 trees was constructed to identify the top 20 predictors. Finally, a 5-year incident HF risk score was developed using the 9 variables selected by backward CoxPH regression.

Results
The study included 8,621 participants (Mean age: 63 y, 62% male) without prevalent HF. The RSF model for incident HF with top 20 predictors derived from the training cohort had superior discrimination than the CoxPH model in the testing cohort (C-index 0.80 vs. 0.78; P < 0.001). The top 9 variables identified included age, waist circumference, BP, serum creatinine, HDL, prior MI, prior CABG, and EKG QTC duration and T-axis. The weighted risk score based on the nine clinical variables was used to create a composite HF risk score ranging from -6 to 36. A 1-unit increment in the risk score was associated with a 27% higher risk of HF at 5 years. A graded increment in the 5-year HF incidence was noted across quintiles of the HF risk score ranging from 1.2% in the lowest to 9.8% in the highest quintile (Figure). The HF risk score demonstrated good discrimination with an overall C-index of 75.2.

Conclusions
In conclusion, an RSF model in a clinical diabetes cohort outperformed conventional CoxPH in the identification of important risk factors of incident HF. Additionally, the diabetes-HF prediction model using common clinical variables demonstrated good discrimination and risk stratification in the overall cohort.
INTRODUCTION: Atherosclerotic abdominal aortic plaque (AAP) is often seen incidentally on magnetic resonance (MR) scans. Prevalence and burden of AAP are associated with cardiovascular disease (CVD) risk factors, but the relationship between AAP and all-cause mortality ("Death") is not well characterized. We sought to determine whether AAP predicts Death among community-dwelling adults initially without clinically overt CVD.

METHODS: 318 Framingham Offspring cohort members (age 60±9 yrs, 51% women) underwent noncontrast abdominal MR at 1.5 Tesla in 1998-1999. Participants were recruited from equal strata of age, sex and quintile of Framingham Risk Score (FRS), with double sampling of the top quintile. MR used ECG-triggered black-blood T2W turbo spin-echo with 1.03 x 0.64 x 5-mm³ voxels. AAP was hand-traced and comprised discrete protrusions of ≥1mm into the aortic lumen. Participants were stratified into three levels of AAP: zero (AAP0); then among those with nonzero-AAP, subdivided into below median (AAP1) and above median (AAP2). FRS was calculated for each participant (using age, sex, systolic blood pressure, total and HDL cholesterol, diabetes, smoking); A Cox proportional hazards model adjusted for standardized, log-transformed FRS (zFRS) was used to determine hazard ratio (HR) for Death with AAP0 as the referent. The log-rank test was used to compare event-free survival.

RESULTS: AAP by MR was present in 40.4% of women and 42.1% of men. Over a median 14.8 years of follow up, there were 52 Deaths (5 CVD, 22 cancer, 25 other causes). AAP2 had HR=2.08 (95% CI 1.07 - 4.08, p=0.03); AAP1 was HR=1.37 (CI=0.65 - 2.92, p=0.4). The figure shows the Kaplan-Meier plot for survival; log-rank p=0.034.

CONCLUSIONS: Among adults initially free of clinically overt CVD, above median burden of AAP was associated with 2-fold greater hazard of all-cause mortality. Although the majority of deaths were not principally due to CVD, excess AAP was a predictor of mortality over nearly 15 year follow up.

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**Validity and Reliability of Pulse Wave Velocity Measurement in a Seated Posture**

Robert J Kowalsky, Texas A&M Univ Kingsville, Kingsville, TX; Lee Stoner, Univ of North Carolina, Chapel Hill, NC; Sophy Perdomo, The Univ of Kansas Medical Ctr, Kansas City, KS; John Michael Taormina, Univ of Pittsburgh Sch of Med, Pittsburgh, PA; Melissa Jones, Univ of Pittsburgh, Pittsburgh, PA; Daniel Credeur, Univ of Southern Mississippi, Hattiesburg, MS; Bethany Barone Gibbs, Univ of Pittsburgh, Pittsburgh, PA

**Introduction**: Accumulating evidence suggests that prolonged sitting may have adverse effects on vascular health. Pulse wave velocity (PWV) is a simple measurement of vascular stiffness that would be advantageous to measure in a seated posture. However, the reliability and validity of PWV measured in a seated posture are unknown. **Objective**: To assess day-to-day reliability and validity of seated peripheral PWV.

**Methods**: This randomized cross-over study (N=20, 50% male, mean (SD) age = 25.9 (7.7)) consisted of two experimental visits, conducted a maximum of 14 days apart. Outcome measures were carotid-radial PWV (crPWV), carotid-ankle PWV (caPWV), and carotid-femoral PWV (cfPWV; supine position only) by tonometry using the Complior Analyse System. Measurements were completed in both a supine and seated posture (counterbalanced), preceded by a 10-minute rest, and following a 12-hr abstention from food, caffeine, nicotine, alcohol, and exercise. Intra-class correlations (ICCs) assessed day-to-day reliability with ≥0.75 as the criterion for good reliability. Validity was determined by comparing (Pearson’s correlation) peripheral PWV measures in the seated compared to supine posture as well as to central PWV measures (supine cfPWV).

**Results**: ICCs for crPWV were 0.64 (supine) and 0.77 (seated) and for caPWV were 0.36 (supine) and 0.76 (seated). Supine vs. seated peripheral PWV measures were highly correlated for crPWV but not correlated for caPWV (Figure). Comparison of supine cfPWV to seated peripheral PWV were r=0.483 (p=0.031) for crPWV and r=0.386 (p=0.103) for caPWV.

**Conclusion**: While measures of seated crPWV and caPWV were both reliable and small-to-moderately correlated with related vascular measures, only seated crPWV was valid compared to the standard supine measure. Future studies evaluating the impact of prolonged sitting and breaking up prolonged sitting could consider measuring crPWV in a seated posture.

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Sedentary Behavior and All-Cause Mortality: A Review of Systematic Reviews With Meta-Analyses

Andrew Lee Mills, Jessica Lee, American Heart Association, Dallas, TX; Trent Sever, Brigham Young Univ, Provo, UT; Christina Marie Shay, American Heart Association, Dallas, TX

Introduction Growing evidence suggests that higher levels of sedentary behavior (SB) are associated with higher risk of death. Multiple systematic reviews with meta-analyses (SRMAs) have been published on this topic and synthesis of these results would have great utility in facilitating knowledge uptake. Purpose The purpose of this project is to synthesize existing SRMAs in order to examine associations between SB and all-cause mortality. Methods A systematic literature review was conducted by querying multiple electronic databases and hand-searching references. Inclusion criteria were SRMAs that reported associations in adults (18+ years old); examined SB as an exposure; included all-cause mortality as an outcome; and where sufficient results were available. Eligibility assessment and data extraction were done in duplicate by two independent reviewers. Discrepancies were solved by consensus. Descriptive characteristics, point estimates, confidence intervals and $I^2$ were extracted from eligible studies. Results A total of 676 records were initially identified. After exclusions based on title, abstract, and full-text assessments, 5 eligible meta-analyses were identified, which included results based on 3,575,480 adults. Among the 5 meta-analyses, the studies per meta-analysis ranged from 3 to 12 and sitting time and television viewing time were the types of sedentary behaviors assessed. Effect sizes (OR, RR, HR) in the identified reports ranged from 0.96 to 1.59 (Figure 1). Conclusions This systematic review of meta-analyses indicates a consistent dose-response of effect sizes between level of SB and all-cause mortality. This emphasizes the importance of targeting SB as a way of improving CV and overall health.


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smoked, and aged 69 to 85 years randomly selected from Kusatsu City, Japan. Using self-administered questionnaire, passive smoking status and passive smoking hour per week at recent 1 year and those of 20 years ago were obtained. They were classified into 4 groups (never, past, current; <2 hours/week, ≥2 hours/week). Endothelial vascular function was assessed with reactive hyperemia index (RHI) using Endo-PAT2000 (itamar-medical). RHI ≤1.67 were defined as low RHI. Age adjusted means of RHI according to passive smoking status was estimated. Simple liner regression analysis tested the association between RHI and traditional atherosclerotic risk factors such as age, body mass index (BMI), systolic and diastolic blood pressure, heart rate, lipids, fasting blood glucose and hemoglobin A1c. Age and multivariable adjusted odd’s ratios and 95% confidence intervals (OR, 95%CI) of passive smoking status for low RHI were estimated using logistic regression. Variables which showed statistical significant association to RHI in simple liner regression were adjusted. Results Distribution of passive smoking status was; never 42.4%, past 42.0%, current <2 hours/week 6.5%, ≥2 hours/week 9.1%. Low RHI was confirmed in 41.2% of study participants. Age adjusted means of RHI did not differ significantly by smoking status (Age adjusted mean ± SD of RHI; never 1.94 ± 0.06, past 1.88 ± 0.06, current <2 hours/week 1.85 ± 0.15, ≥2 hours/week 2.15 ± 0.13, p=0.270). In simple liner regression analysis, BMI, diastolic blood pressure, heart rate and fasting glucose showed statistical significant association to RHI, and these variables were adjusted in multivariable adjusted logistic regression model. In logistic regression analyses, significant association of passive smoking status to low RHI was not confirmed (Age adjusted OR (95%CI); never (reference), past 1.00 (0.57-1.75), current <2 hours/week 1.45 (0.50-4.23), ≥2 hours/week 0.66 (0.25-1.76), multivariable adjusted OR (95%CI); never (reference), past 1.02 (0.57-1.82), current <2 hours/week 1.72 (0.57-5.21), ≥2 hours/week 0.61 (0.22-1.73)]. Conclusion Passive smoking status was not associated to endothelial vascular function assessed with RHI among general Japanese women. Further investigation is still required.


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P383

Smoking Cessation and Weight Change in Relation to Cardiovascular Disease Incidence and Mortality Among Patients With Diabetes Mellitus


Introduction: Some studies suggested that smoking cessation could result in short-term weight gain, deterioration in glycemic control, and worsening of some diabetic symptoms. It is unclear whether weight gain following smoking cessation might mitigate the health benefits among adults with diabetes. Hypothesis: Smoking cessation is associated with a lower risk of cardiovascular disease (CVD) incidence and mortality among individuals with diabetes, and weight gain following smoking cessation does not modify the association. Methods: This prospective analysis included 9,780 men and women with type 2 diabetes from the Nurses’ Health Study (1984-2014) and Health Professionals Follow-Up Study (1988-2014). Information on newly diagnosed diseases, medical history, dietary and lifestyle factors, including smoking status and weight change, was updated every two years through validated questionnaires. Results: During 154,825 person-years of follow-up, there were 2,590 incident CVD cases and 3,326 deaths among participants.
with diabetes. Compared with those who continued to smoke, quitters had a lower risk of CVD incidence, regardless of weight change after quitting. The multivariate-adjusted hazard ratios (95% confidence intervals) for CVD were 0.66 (0.54-0.81) among recent quitters (<6 years since smoking cessation) without weight gain, 0.69 (0.47-0.99) among recent quitters with weight gain of 0.1 to 5.0 kg, 0.57 (0.37-0.87) among recent quitters with weight gain of more than 5.0 kg, 0.71 (0.60-0.83) among longer-term quitters (>6 years since smoking cessation), and 0.51 (0.45-0.59) among neversmokers. Similar results were observed for CVD, cancer, and all-cause mortality, although the associations did not reach statistical significance among recent quitters with weight gain.

**Conclusions:** Smoking cessation was associated with a lower risk of CVD incidence among men and women with diabetes, even among those who gained weight after quitting. A health benefit of smoking cessation on mortality was also observed.


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**P385**

**Cigarette Smoking and Incident Stroke in African Americans of the Jackson Heart Study**

**Adebamike Adedayo Oshunbade**, Dept of Med, Univ of Mississippi Medical Ctr, Jackson, MS; Wondwosen K Yimer, Karen A Valle, Dept of Data Sciences, Univ of Mississippi Medical Ctr, Jackson, MS; Donald Clark III, Dept of Med, Univ of Mississippi Medical Ctr, Jackson, MS; Wendy B White, Tougaloo Coll, Tougaloo, MS; Andrew P Defilippis, Div of Cardiovascular Med, Univ of Louisville, Louisville, KY; Michael J Blaha, Ciccarone Ctr for the Prevention of Heart Disease, Johns Hopkins Univ, Baltimore, MD; Emelia J Benjamin, Boston Univ Sch of Med, Boston Univ Sch of Public Health, Boston, MA; Emily O’Brien, Dept of Med, Duke Univ Medical Ctr, Durham, NC; Javed Butler, Adolfo Correa, Michael E Hall, Dept of Med, Univ of Mississippi Medical Ctr, Jackson, MS

**BACKGROUND:** African-Americans (AAs) are disproportionately affected more by stroke compared to whites, however less is known about the relationship between stroke and cigarette smoking, a modifiable risk factor, in AAs. Therefore, we evaluated the relationship between cigarette smoking and incident stroke in the Jackson Heart Study (JHS).

**METHODS AND RESULTS:** JHS participants without a history of stroke (n=4894) were classified by self-reported baseline smoking status into current, past (smoked at least 400 cigarettes/life) or never smokers at baseline (2000-2004). Current smokers were further classified by smoking intensity [number of cigarettes smoked per day (1-10, 10-19 and ≥20)] and followed for incident stroke (through 2014). Stroke events were adjudicated in the JHS.

Hazard ratios for incident stroke for each smoking group compared to never smokers were estimated using the Cox proportional hazard regression models after adjusting for covariates. At baseline there were 633 (13.1%) current, 892 (18.4%) past and 3327 (68.6%) never smokers. During follow-up (11.8 median follow-up years), 201 participants developed incident stroke. After adjusting for age, sex, body mass index, hypertension, diabetes mellitus status, total cholesterol, triglycerides,
prevalent cardiovascular disease, physical activity, aspirin, statin, and alcohol consumption in the past 12 months and level of education, the risk for stroke in current smokers was significantly higher compared to never smokers (HR 2.33, 95% CI 1.16-4.68) but there was no significant difference between past smokers and never smokers (HR 0.96, 95% CI 0.53-1.75). There was a dose-dependent increased risk of stroke with smoking intensity which was not statistically significant.

**CONCLUSIONS:** In a large prospective cohort of AAs, current cigarette smoking was associated with incident stroke in adjusted models. These findings suggest that smoking cessation may have potential benefits in reducing the incidence of stroke in this population.

**BACKGROUND**

In 2016 according to the center for disease control (CDC), 11.3% of high school students and 3.2% of US adults reported using electronic cigarettes (E-cigs) in the previous 30 days. E-cigs have been advertised as a safer alternative to smoking. However, E-cig use, like smoking, delivers ultra-small aerosol particles which may be associated with cardiovascular disease. E-cig users have shown similar endothelial dysfunction, aortic stiffness, platelet activation, aggregation, and adhesion as seen with smoking in animal models.

**METHODS**

The National Health Interview Survey (NHIS) a survey of people aged 18 years and older, is conducted by the U.S. Census Bureau using in-person interviews in a random sampling of U.S households is conducted by the CDC. This study is a cross-sectional analysis of the NHIS data of 2014 (n=36,697), 2016 (n=33,028) and 2017 (n=26,742). The following outcomes were analyzed for e-cig users vs. non-users and smoker’s vs. non-smokers: myocardial infarction, hypertension, diabetes, depression/anxiety/emotional problems, circulatory problems, and stroke. For the outcomes, multiple logistic regression model was conducted to determine the covariate-adjusted odds ratio as well as to achieve the most appropriate p-value for the effects in the model. Variables such as age, BMI and sex were considered as covariates in multiple logistic regression models using SAS 9.4 software.

**RESULTS**

Compared with non-E-Cig-users, E-cigarette users had a lower mean age (32.9 vs 40.4 years) and similar BMI (28.1 vs 28.07). In multiple logistic regression analysis, E-Cig users had higher odds of having myocardial infarction [OR - 1.558, 95% CI (1.447, 1.678), P <0.0001], stroke [OR - 1.297, 95% CI (1.201, 1.400), P <0.0001], depression/anxiety/emotional problems [OR- 2.200, 95% CI (2.063, 2.347),


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P387

**Comparing Cardiovascular Outcomes Among Smokers and E-Cigarette Users: A Review From National Health Interview Surveys**
P<0.0001] and circulatory problems [ OR - 1.436, 95% CI (1.251, 1.648), P < 0.0001]. E-cig users had lower odds of having diabetes. There was no significant difference between the two groups on the odds of hypertension [OR - 0.971, 95% CI (0.942, 1.001), P = 0.059] and. Smokers had higher odds of myocardial infarction [OR 2.652, 95% CI (2.516, 2.796), P < 0.0001], stroke [OR - 1.781, 95% CI (1.691, 1.875), P <0.0001], depression/anxiety/emotional problems [OR 1.694, 95% CI (1.598, 1.795), P <0.0001], circulatory problems [OR - 1.491, 95% CI (1.338,1.661), P < 0.0001], Hypertension [OR - 1.483, 95% CI (1.452, 1.513), P < 0.0001] and Diabetes [OR - 1.170, 95% CI (1.130, 1.211), P < 0.0001] compared with non-smokers.

CONCLUSION
E-cig users have higher odds of myocardial infarction, stroke, depression/anxiety/emotional problems, circulatory problems (including blood clots) and lower risk of hypertension and diabetes compared to non-E-cigarette users. However, there is a need for cohort studies to establish the causation linkage for the cardiovascular outcomes described above.

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P388

Socioeconomic and Demographic Status and Perceived Health Risk of E-cigarettes Among Youth--Results From a National Survey

Thanh-Huyen T Vu, Northwestern Univ, Chicago, IL; Allison Groom, American Heart Association, Dallas, TX; Joy L Hart, Univ of Louisville, Louisville, IL; Hy Tran, NORC at the Univ of Chicago, Chicago, IL; Robyn L Landry, American Heart Association, Dallas, TX; Jennie Z Ma, Univ of Virginia, Charlottesville, VA; Kandi L Walker, Univ of Louisville, Louisville, KY; Aida L Giachello, Northwestern Univ, Chicago, IL; Anshula Kesh, American Heart Association, Dallas, TX; Thomas J Payne, Univ of Mississippi Medical Ctr, Jackson, MS; Rose M Robertson, American Heart Association, Dallas, TX

Background: The prevalence of e-cigarette use among youth is on the rise and may be associated with adolescents' limited knowledge of the health effects of these products. We examined how demographics and socioeconomic status (SES) are correlated with the perceived health risks of e-cigarettes among youth. Methods: Data from a national online survey of youth aged 13-18 in 2017, weighted to be representative of the overall U.S. population in age, sex, race, ethnicity, and region were analyzed. Differences in perceived health risks of nicotine and other chemicals provided by vaping were addressed with respect to the demographics and SES of the participants, taking into account their e-cigarette use status. Results: Among 3,174 participants, 56.5% were female, 19.3% Hispanics and 14.7% non-Hispanic Blacks. Indicators of low SES [family receiving public assistance (PA) or participating in free school lunch program] were seen in 50.2%. With adjustment for e-cigarette use status in multivariable regression models, perceived health risks from the contents of e-cigarettes differed by gender, age, place of residence, and SES status. For example, the odds of perceiving harm from nicotine in e-cigarette products was 1.6 times higher in girls than in boys; the same odds was lower by 27% for those in families receiving government PA compared to those in families that did not. A parent’s education level also significantly influenced their child’s perception of the harm of the contents of e-cigarette products (see Figure). Conclusions: For youth, the perceived health risks of nicotine, toxins or chemicals in e-cigarette products were significantly different by age, gender, race/ethnicity, and SES. The findings may have relevance for developing communications and education strategies
targeting specific youth audiences, especially those in vulnerable groups. These strategies could improve awareness among youth concerning the health effects of e-cigarettes, helping to prevent or reduce e-cigarette use.


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P389

Smoking, Biomarkers and Ischemic Stroke Risk: The Reasons for Geographic and Racial Differences in Stroke (REGARDS) Cohort

Juan Conde, Univ of Vermont - Larner COM, Burlington, VT; Maxwell Pistilli, Drexel Univ, Philadelphia, PA; Timothy Plante, Neil Zakai, Univ of Vermont - Larner COM, Burlington, VT; Leslie McClure, Drexel Univ, Philadelphia, PA; Nels Olson, Univ of Vermont - Larner COM, Burlington, VT; George Howard, Univ of Alabama at Birmingham, Birmingham, AL; Mary Cushman, Univ of Vermont - Larner COM, Burlington, VT

Introduction: Identifying biological pathways that mediate the increased stroke risk in smokers may allow study of novel strategies to reduce risk. In the REGARDS study, we evaluated the association of smoking status with incident stroke and assessed biomarkers as mediators of smoking related stroke.

Methods: 30,239 black and white adults aged 45 and older were enrolled in 2003-7, and followed for incident stroke. Biomarkers were measured in a case cohort substudy and compared across groups of smoking status (never, former or current). Hazard ratios (HRs) of stroke by smoking status and by pack years were calculated using Cox proportional hazards models.

Results: Among 1,224 participants with biomarker data (mean age 62, 50% male, 50% black) there were 531 incident stroke cases over 12.9 yrs maximal follow up. Compared to never smokers, the multivariable (age, race, sex and Framingham risk factors) adjusted HR of stroke in current smokers was 1.30 (95% CI 1.11, 1.53) and in former smokers was 1.18 (95% CI 1.05, 1.32). The association of pack years with stroke was substantial in current smokers and weak in former smokers in the adjusted model (Table). Among 7 biomarkers, white blood count, interleukin-6 (IL-6) and fibrinogen were higher in former and current smokers, and with increasing pack years in both groups (data not shown). The association of pack years with stroke in current smokers was partly attenuated with adjustment for IL-6, but not white count or fibrinogen. Among former smokers, white count fully attenuated the weak association.

Conclusions: Former and current smoking, and pack years (primarily among current smokers) were stroke risk factors in a contemporary biracial cohort. Among both current and former smokers, smoking-related stroke risk was attenuated after adjustment for IL-6 and white count respectively, suggesting biological pathways for intervention.
Comparison of the Acute Autonomic Effects of Mainstream Cigarette Smoke to Oral Nicotine Spray

Affan B Irfan, George Koromia, Waiel Abusnina, Mark Studney, Marshall Univ, Proctorville, OH; Aruni Bhatnagar, Alex Carll, Envirome Inst, Louisville, KY

Background: Smoking and exposure to environmental tobacco smoke are associated with sympathetic nervous system activation, a leading putative mechanism of adverse cardiovascular events. However, the role of nicotine in cigarette smoke’s sympathomimetic effects remains unknown.

Methods: Healthy young smokers were recruited and fasted from food and nicotine/tobacco products for >8 hours before each of two visits. On each visit, participants underwent a 12-lead resting electrocardiogram (ECG) for 5 minutes indoors (pre-exposure), 20 minutes outdoors (mid-exposure), and 5 minutes indoors (post-exposure). On the first day, participants smoked cigarette of their preferred brand, and on second day used 4 mg of oral nicotine spray instead.

Results: Heart rate (HR) increased from 65 ± 20 beats/min (BPM) at pre-exposure to 80 ± 25 BPM during cigarette use (23% increase), and to 78 ± 37 BPM during use of nicotine alone (20% increase) (p<0.05 vs pre-exposure). There was no significant difference in average HR between pre and post exposure. SDRR did not change significantly between phases and exposures (Pre, mid and post exposure (ms) for cigarette; 59 ± 20, 68 ± 25, 57 ± 20 and for nicotine; 70 ± 26, 79 ± 37 and 62 ± 22, respectively.) However, RMSSD decreased with cigarette use by 25% (p<0.01), and also with nicotine but was not significant. Conversely, LF/HF increased during cigarette and nicotine-only exposures relative to pre-(>150%) and post-exposure (>15%) (p<0.05).

Conclusion: Our findings suggest smoking may acutely induce relative sympathetic dominance through nicotine, with potential additive effects of other aerosol constituents within tobacco smoke (e.g., aldehydes and particulates).

Association of Peripheral Artery Disease With the Use of Smokeless Tobacco, Cigars, or Pipes in the Atherosclerosis Risk in Communities Study
Jeremy R Van’t Hof, Wendy Wang, Univ of Minnesota, Minneapolis, MN; Kunihiro Matsushita, Johns Hopkins Univ, Baltimore, MD; Rachel Widome, Aaron R Folsom, Pamela L Lutsey, Univ of Minnesota, Minneapolis, MN

Background: Cigarette smoking is one of the strongest modifiable risk factors for peripheral artery disease (PAD), a disease which affects over 200 million people worldwide. Though cigarette use has decreased across time, use of cigars, pipes and smokeless tobacco remains unchanged or slightly increased. The association of PAD and non-cigarette tobacco use is not well described. Thus, we tested the hypothesis that the use of cigars, pipes or smokeless tobacco is associated with incident PAD even after adjustment for cigarette use.

Methods: A total of 14,395 Atherosclerosis Risk in Communities (ARIC) Study participants with no history of prevalent PAD were followed from 1987 to 2015 for PAD events (hospitalizations with PAD diagnosis or leg revascularization). Baseline pipe, cigar smoking and smokeless tobacco use was self-reported. Multivariable-adjusted Cox proportional hazards regression was used.

Results: At enrollment the 14,395 participants included in the study were on average (SD) 54 (6) years old, 55% female and 27% African American; 489 (3.4%) were current users of smokeless tobacco and 481 (3.3%) current users of cigars or pipes. A total of 1,289 incident PAD events occurred during a median of 25.9 years of follow-up. After adjustment for demographics and cigarette smoking status, risk of incident PAD was higher among current (versus never) users of smokeless tobacco [HR (95% CI): 1.66 (1.29-2.12)], though this association was attenuated with adjustment for CVD risk factors (Table). Cigar and pipe use were not associated with PAD incidence, regardless of degree of adjustment (Table).

Conclusion: Active use of smokeless tobacco was associated with increased risk for incident PAD compared to non-use, independent of cigarette smoking, although this relationship was not statistically significant after adjustment for cardiovascular risk factors. No association was observed with use of pipes or cigars. Use of smokeless tobacco may increase PAD risk and could be a potential target for intervention.


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Association Between Migration to the US, Cardiovascular Disease, and Cardiovascular Risk Factors Among Mexican Migrants and Non-Migrants

Aresha Martinez-Cardoso, Univ of Chicago, Chicago, IL; Arline Geronimus, Univ of Michigan, Ann Arbor, MI

Background: Mexico-US migration represents one of the largest migration flows across the globe. However, debates abound over whether health selection is a salient driver of migration, and furthermore how migration shapes the health of Mexican migrants. Objectives: To address these gaps in the literature, we used binational data from Mexico to compare cardiovascular risk factors and health profiles of (1) Mexico-US nonmigrants and future migrants and (2) Mexico-US nonmigrants and return migrants. Methods: Data from the Mexican Family Life Survey, a nationally-representative survey with measures of migration and health, was used for the analysis. We estimated a series of mixed effects logistic regression models to assess the association between (1)
cardiovascular health at baseline and future migration status and (2) exposure to the US (migration to the US and time in the US) and cardiovascular health. Cardiovascular health indicators included obesity, waist-hip circumference (WHC), high blood pressure, self-reported diabetes, self-reported cardiovascular disease, and smoking and physical activity behaviors. **Results:** Cardiovascular health was not a significant predictor of future migration to the US; that is, the health of Mexico-US migrants’ was on par with their compatriots who do not migrate. However for some cardiovascular indicators, the health of return migrants with exposure to the US was worse than non-migrants. Return migrants had higher levels of adiposity, obesity (OR=1.38, 95% CI 1.05,1.80), and elevated WHC (OR=1.45, 95% CI 1.07,1.95). Furthermore, time spent in the US was significantly associated with obesity (OR=1.005, 95% CI 1.001,1.009), elevated waist circumference (OR=1.003, 95% CI 1.001,1.007), and self-reported cardiovascular disease (OR=1.005, 95% CI 1.002,1.009). Finally, the association between exposure to the US and poorer cardiovascular health was not mediated by physical activity or smoking behavior. **Conclusions:** Our findings shed light on the drivers of Mexican immigrants’ health, and underscore the important of considering the social and environmental context faced by migrants in the US as an important determinant of cardiovascular health.

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**Health Literacy Within a Diverse Community-Based Cohort: The Multi-Ethnic Study of Atherosclerosis**

**Introduction**

In 2018 the American Heart Association released a Scientific Statement on the importance of health literacy to cardiovascular disease (CVD) primary and secondary prevention. Health literacy has been defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.” However, most studies exploring the prevalence of health literacy have been conducted in populations that were demographically relatively homogeneous.

**Hypothesis**

Using cross-sectional data from the race-ethnically diverse, sex-balanced and community-based Multi-Ethnic Study of Atherosclerosis (MESA), we tested the hypotheses that low health literacy was associated with older age, lower income and less acculturation.

**Methods**

Four standard questions assessing health literacy were asked during annual phone follow up encounters which took place from August 2016 through August 2018. The questions assessed: 1) ability to read materials received from a doctor, 2) problems learning about health conditions, 3) confidence in filling out medical forms, and 4) understanding of medical statistics. Consistent with prior literature, responses to the 4 questions were combined into a composite score, and then a dichotomous variable was created to classify health literacy as low or adequate. Prevalence ratios (PRs) and 95% confidence intervals (CIs) were calculated, adjusted for age, sex, and race/ethnicity.
Race/ethnicity-stratified associations were also explored.

Results
Our sample consisted of 3,638 adults ages 53-94 years (median, 69), including 1,513 White, 445 Chinese, 936 Black, and 734 Hispanic participants. A total of 15.4% had low health literacy, which was more common among elderly [PR (95% CI) for ≥70 years vs. <70 years: 2.24 (1.92, 2.61)], female [1.23 (1.07, 1.42)] and lower income [3.56 (2.82, 4.49)] participants, respectively. A higher prevalence of low health literacy was observed among participants who were Chinese, [PR (95% CI): 5.22 (4.15, 6.55)] Hispanic [4.94 (3.97, 6.14)], and Black [1.35 (1.01, 1.79)], relative to white participants. Acculturation factors such as non-US place of birth, fewer generations in the United States, and language other than English spoken in the home were all also associated with lower health literacy. When stratified by race/ethnicity, patterns of health literacy with age, sex, income and acculturation were similar to findings from the full study population.

Conclusions
Within a diverse population low health literacy was more common among individuals who were older, female, had lower income, and were less acculturated. Since patients with low health literacy may need additional support to optimize their cardiovascular health, our results illustrate possible priority populations for health education intervention.


Funding: No

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P395

Examining the Relationship Between Physical Activity Resources and Self-reported Vigorous Physical Activity in a Resource-limited Community: Data From the Washington DC Cardiovascular Health and Needs Assessment

Joniqua N Ceasar, Tiffany M Powell-Wiley, Marcus Andrews, Natl Insts of Health, Bethesda, MD; Colby Ayers, Univ of Texas - Southwestern, Dallas, TX; Billy Collins, Steven Langerman, Valerie Mitchell, Kosuke Tamura, Natl Insts of Health, Bethesda, MD

Background: Despite well-documented evidence that one’s neighborhood environment and resource access are associated with cardiovascular (CV) risk, little is known about how physical activity (PA) resource access availability and type are related to vigorous PA (VPA) in urban communities. Methods: Using cross-sectional data from the Washington DC CV Health and Needs Assessment, a sample of 37 black adults living in low-income, limited-resource DC communities, we created one outcome: self-reported VPA hours/week. We used Geographic Information Systems to create three exposure variables: counts of parks, recreation facilities, and private gyms within 800 and 1600-meter (m) line-based road network buffers around homes. We examined the relationship between the three exposures and VPA in models adjusted for demographics (age, sex, and income) and neighborhood factors, including neighborhood deprivation index (NDI), neighborhood environment perception (NEP), or walk score (WS), separately. Results: Participants (mean age=57.65 years) reported a mean VPA hr/wk of 3.46. After separately adjusting for neighborhood factors, greater availability of parks within 800m and 1600m positively associated with VPA (p<0.01) (Table). Positive associations between recreation facilities and VPA were found with 1600m buffer (p<0.05), but not 800m. Private gyms had the weakest relationship with VPA. When considering WS, only the relationship with parks remained significant. Conclusions: Increased availability of parks was positively related to VPA, even after adjusting for NDI, NEP or WS. However, relationships were not as robust for recreation resources.
facilities and private gyms, perhaps due to higher likelihood of barriers to use or limited availability in these communities. Our findings suggest that DC public health professionals should consider prioritizing increased availability of PA resources, especially parks, to promote PA and ultimately improve CV health outcomes for residents within limited-resource communities.


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Funding Component:

P397

Neighborhood Environment Perceptions Associate With Depression Levels and Cardiometabolic Risk: Data From the Washington, DC Cardiovascular Health and Needs Assessment


Background Little is understood about associations between perceived neighborhood characteristics and depression, a known cardiovascular (CV) disease risk factor, in diverse populations. We examined the relationship between neighborhood environment perception (NEP), depression, and CV disease markers within an urban, predominantly African-American (AA) cohort. Methods We conducted the DC CV Health and Needs Assessment, a health evaluation among adults (n=100) in resource-limited DC communities. We measured overall NEP and factor analysis identified three NEP sub-scores: 1) neighborhood violence; 2) physical environment; and 3) social cohesion (higher score=more favorable NEP). Depression was defined by the revised Center for Epidemiologic Studies Depression Scale (CESD-R, higher score=higher depression likelihood). We leveraged linear regression modeling to examine NEP and depression associations adjusting for race, income, Framingham risk score, and neighborhood deprivation index (NDI). A population subset (n=42) provided blood samples which were tested for levels of IL-1β, IL-18, and CRP by ELISA (Mesoscale Diagnostics, USA). Results Participants (n=100; mean age = 59; 99% AA) had a mean CESD-R score=5.8 (SD=8.9) and mean NEP score=56.1 (SD=12.6). In fully adjusted models, more favorable perceptions of one’s neighborhood are related to lower depression symptoms in a predominantly AA cohort from Washington, DC resource-limited communities. Additionally, increasing CESD-R score was related to higher pro-inflammatory markers. These results

<table>
<thead>
<tr>
<th>Neighborhood Factor</th>
<th>Network Buffer¹</th>
<th>Physical Activity Resource</th>
<th>β¹</th>
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<tr>
<td>Neighborhood Deprivation Index²</td>
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<td>Park</td>
<td>0.71***</td>
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<td></td>
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<td>Private Gym</td>
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<td></td>
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<td>Recreation Facility</td>
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<tr>
<td></td>
<td>1600m</td>
<td>Park</td>
<td>1.04***</td>
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<td></td>
<td>Private Gym</td>
<td>1.65*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recreation Facility</td>
<td>2.35*</td>
</tr>
<tr>
<td>Neighborhood Environment Perception⁴</td>
<td>800m</td>
<td>Park</td>
<td>0.77***</td>
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<td></td>
<td>Private Gym</td>
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<td>Park</td>
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<td>1.54*</td>
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<tr>
<td></td>
<td></td>
<td>Recreation Facility</td>
<td>2.33*</td>
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<tr>
<td>Walk Score⁶</td>
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<td>Park</td>
<td>0.69***</td>
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<td></td>
<td>Private Gym</td>
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<td></td>
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<td>2.14</td>
</tr>
</tbody>
</table>

Notes:

¹Network buffer is based on an 800m or 1600m line-based road network buffer around each participant's residence.
²β (beta coefficient) represents change in hours spent in weekly vigorous PA for every one unit increase in the number of PA resources.
³Neighborhood Deprivation Index (NDI) is an objective measurement of an individual's neighborhood socioeconomic status.
⁴Neighborhood Environment Perception (NEP) is defined by individual responses to survey questions about perceived neighborhood violence, the physical environment, and social cohesion.
⁵Walk Score (WS) is a walkability index for an individual's neighborhood. Significance level: *p<0.05; **p<0.01; ***p<0.001.
suggest that improving individuals’ neighborhood perceptions may be beneficial in improving the psychological well-being and, ultimately, CV health of urban minority residents.

Figure: Positive Neighborhood Perception. Factors associated with Lower CES-D-R scores among participants from the Washington, DC Community Health and Needs Assessment (DC-CRNA) (N=100)

Total Perception \* Total sum of all of the sub-scores
Factor 1: Environmental Violence: measures perceptions about safety and violent fights
Factor 2: Physical Environment: measures perceptions about traffic, noise, tree, litter, recreation facilities etc.
Factor 3: Social Cohesion: measures perceptions about similar values, trust, and helpfulness of neighbors

*Higher scores=better perceptions

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**Introduction:** Food insecurity (FI) is disproportionately experienced by Mexican families. While associations between FI and cardiovascular health (CVH) factors have been recognized, less is known about how fluctuations in FI experiences throughout life relate to CVH or whether FI experiences have intergenerational effects. This study examines the associations between Mexican mothers’ FI experiences in childhood and currently, with their own and their 4-6 year old child’s odds of having optimal CVH.

**Methods:** Mexican mother-child dyads were recruited in central Mexico, and central IL, US. Mothers were asked about their experiences with food insecurity “in the last 12 months”, and “when they were children” using an adapted version of the USDA Food Insecurity and Hunger Module. Optimal CVH was defined as having desirable measurements of six CVH factors: BMI/BMI-Percentile, blood glucose, triglycerides, total cholesterol, HDL, and LDL cholesterol. FI experiences were categorized based upon whether mothers (1) never experienced FI, (2) experienced FI only in childhood, (3) experienced FI currently, but not in childhood, or (4) experienced FI in childhood and currently. Logistic regression was used to determine associations between FI and optimal CVH (6 factors vs. <5), adjusted for age, years of education, country of residence, and child sex.

**Results:** Overall 28% mothers and 49% children had optimal CVH. FI was experienced by 19% of mothers in childhood only, by 14% currently, but not in childhood, and by 35% in childhood and currently. FI experiences were not associated with optimal CVH among the mothers. Compared to children of mothers who never experienced FI, children born to women who experienced FI only in childhood, but not currently were less likely to have optimal CVH (OR=0.15; 95% CI: 0.03, 0.91).

**Discussion:** Mexican mothers who experienced...
FI during childhood, but not currently were less likely to have children with optimal CVH. Feeding patterns of mothers who experienced FI as children merit further investigation.

Disclosures:  

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Two-Year Trends and Determinants of Electronic Cigarette Use Among Patients With Cardiovascular Disease in the United States

Paul M Ndunda, Mohinder Vindhyal, Tabitha Muutu, Cyrus Munguti, Univ of Kansas Sch of Med-Wichita, Wichita, KS

BACKGROUND The use of electronic cigarettes (e-cigarettes) is on the rise in the US. It increased in adults aged 25-44 years from 2.4% in 2012 to 4.2% in 2016 and from 2% to 2.8% between ages 55 to 64 over the same period. Among the youth, the increase was 900% between 2011 and 2015. Much remains to be known about the health effects of e-cigarette use, but epidemiologic studies suggest an independent association between e-cigarette use and cardiovascular disease. There is a need for data on the social and demographic factors that are predictive of use in adults with cardiovascular disease (CVD), to identify the appropriate focus of intervention. METHODS This is an analysis of the 2016 and 2017 Behavioral Risk Factor Surveillance System (BRFSS) data, an annual chronic disease and behavioral risk factor survey conducted by the CDC. The sample included the 110,028 respondents that reported a history of heart attack, angina/coronary heart disease or stroke. The rates of e-cigarette use were calculated, and a multiple logistic regression analysis was used to assess associated factors. RESULTS Among respondents with CVD, there was no change in e-cigarette use between 2016 and 2017 [3.1% to 2.8% adjusted OR (aOR) 1.08 (95% CI 0.95 - 1.24)]. The median age of e-cigarette users was 58 years and that of non-users was 69 years (p<0.0001). Women had a higher rate of e-cigarette use compared with men [3.2% vs 2.7% aOR 1.17(1.04-1.31)]. Other factors associated with e-cigarette use were: race [blacks vs whites 1.9% vs 3% aOR 0.37(0.28-0.49)], sexual orientation [LGBTQ vs non-LGBTQ 7.1% vs 2.9% aOR 1.56 (1.24-1.96)], smoking [current smokers vs non-smokers 11.1% vs 1.2% aOR 6.0 (5.3-6.8), smoking on some days vs never smoked 12.7% vs 0.24 aOR 51(35.4-73.5)], mental illness [6.4% vs 1.8% aOR 1.57 (1.37-1.810)] and state of residence (p<0.0001). CONCLUSION In conclusion, there was no significant change in e-cigarette use between 2016-2017 among respondents with CVD. The highest rates of e-cigarette use were among subjects who were: smokers on some days, current smokers, LGBTQ and had a mental illness.

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P399

P400
Household Salt Intake Level is Associated With All-Cause, Cardiovascular and Stroke Mortality: A 24-Year Follow-Up of Nippon Data80

Azusa Shima, Naomi Miyamatsu, Katsuyuki Miura, Naoko Miyagawa, Shiga Univ of Medical Science, Shiga, Japan; Nagako Okuda, Univ of Human Arts and Sciences, Saitama, Japan; Nobuo Nishi, Nat Insts of Biomedical Innovation, Health and Nutrition, Tokyo, Japan; Katsushi Yoshita, Osaka City Univ Graduate Sch of Human Life Science, Osaka, Japan; Tomonori Okamura, Keio Univ, Tokyo, Japan; Akira Okayama, Res Inst of Strategy for Prevention, Tokyo, Japan; Hirotsugu Ueshima, Shiga Univ of Medical Science, Shiga, Japan; NIPPON DATA80 Research Group

Background Dietary salt intake is associated with the risk of raised blood pressure and cardiovascular diseases (CVD). In Asian countries, a major source of salt intake is seasoning or table salt from cooking at home. However, little is known about the relationship between salt intake level of the entire household and CVD mortality risk.

Objective We aimed to investigate the relationship between household salt level and mortality from all-causes, CVD, stroke and subtypes of stroke in a 24-year follow-up study of a Japanese representative population (NIPPON DATA80).

Methods NIPPON DATA80 is a cohort study based on the National Nutrition Survey and the National Survey on Circulatory Disorders conducted by Japanese government in 1980. A total of 8,702 individuals (56% women) who were living with someone such as family were included in this analysis. Participants were 30-79 years old and none had a history of myocardial infarction or stroke. Household salt level was evaluated as the amount of salt consumption (g) per 1000 kcal of total energy intake in each household. The amount of salt consumption and total energy intake were evaluated using 3-day weighed food records at baseline. We used Cox proportional hazards models to evaluate the effect of household salt level for each mortality. Multivariable-adjusted hazard ratios (HRs) and confidence intervals (CIs) for a salt increment of 2g/1000 kcal (1 standard deviation) were calculated after adjusting for sex, age, body mass index, smoking status, drinking status, daily physical activity level, household-based potassium, household-based saturated fatty acid and household-based long-chain n-3 polyunsaturated fatty acid.

Results In 186,186 person-years of follow-up, there were 27.1% (2360 of 8702) deaths, among which CVD were 787 (9.0%), and stroke were 361 (4.1%). Household salt level was 6.25 (±2.02) mg/1000 kcal. Multivariable-adjusted HRs for a 2g/1000 kcal increment in household salt level were 1.07 (1.02-1.11) for all-causes mortality, 1.11 (1.03-1.19) for CVD mortality and 1.12 (1.00-1.25) for stroke mortality. In the analysis for subtypes of stroke, the relative risk of mortality from cerebral hemorrhage was significantly increased (p for trend = 0.024); the HR (95%CI) for a 2g/1000 kcal increment of household salt level was 1.28 (1.03-1.59). However, the association for mortality from cerebral infarction was not significant (HR 1.05; 95% CI 0.91-1.22).

Conclusion Household salt level was associated with long-term risk of all-cause, CVD and stroke mortality in a representative population of Japanese men and women. The association was stronger for mortality risk from cerebral hemorrhage.


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P401
Female Gender is a Significant Risk Factor for Functional Disability After Hemorrhagic Stroke but Not Ischemic Stroke Among Japanese Community-Dwelling Elderly Individuals

Kozo Tanno, Shuko Takahashi, Iwate Medical Univ, Morioka, Japan; Yuki Yonekura, St. Luke's Intl Univ, Tokyo, Japan; Masaki Ohsawa, Shinich Omama, Yasuhiro Ishibashi, Iwate Medical Univ, Morioka, Japan; Kazuyoshi Itai, Morioka Univ, Takizawa, Japan; Toshiyuki Onoda, Toru Kuribayashi, Iwate Univ, Morioka, Japan; Kuniaki Ogasawara, Fumitaka Tanaka, Motoyuki Nakamura, Iwate Medical Univ, Morioka, Japan; Makoto Koshiyama, Iwate Health Service Association, Morioka, Japan; Kiyomi Sakata, Iwate Medical Univ, Morioka, Japan; Akira Okayama, Res Inst of Strategy for Prevention, Tokyo, Japan

Introduction: Previous studies have indicated that the female gender is one of the important risk factors for disability after stroke; however, most studies have been conducted in Western countries, and the higher risk of disability after stroke observed in women is thought to be different in Japan, where the proportion of hemorrhagic stroke (HS) is relatively higher than that in Western countries. Hypothesis: We assessed the hypothesis that the higher risk of disability after stroke attributable to the female gender was different between ischemic stroke (IS) and HS. Methods: We used 10-year community-based cohort data of 8,698 participants aged 65 years or older without cardiovascular disease or long-term care insurance (LTCI) at the time of the baseline survey. The stroke incidence was confirmed by reviewing the Iwate Stroke Registry. Functional disability was defined as being newly certified by the LTCI system. Participants were classified into three groups: G1, event-free (no stroke and no disability, n=7,950); G2, no disability after stroke (IS=177, HS=55); and G3, disability after stroke (IS=346, HS=170). Multivariate-adjusted odds ratios (ORs) of the female gender in G2 and G3 (reference: G1) were calculated using multinomial logistic regression with adjustments for age, hypertension, diabetes, dyslipidemia, overweight, current smoking, regular alcohol consumption, and regular exercise separately in those with IS and HS.

Results: The ORs of the female gender were not high in G3 in IS, while the OR (95% confidence interval) was significantly high in G3 (1.55 (1.03-2.34)) in HS (see table). Conclusions: The proportion of females in the subjects with disabilities after HS was significantly higher than the proportion of males after multivariate adjustment. This suggested that the female gender was a significant risk factor for disability after HS, but not after IS in Japanese community-dwelling individuals.

Table. Multivariate-adjusted odds ratios (95% confidence interval) by stroke subtype

<table>
<thead>
<tr>
<th>Stroke type</th>
<th>IS</th>
<th>HS</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 no stroke</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>G2 no disability</td>
<td>0.90 (0.65-1.25)</td>
<td>0.70 (0.41-1.18)</td>
</tr>
<tr>
<td>G3 disability</td>
<td>1.55 (1.03-2.34)</td>
<td>1.10 (0.65-1.86)</td>
</tr>
</tbody>
</table>


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Funding Component:

P402

Association Between Post-stroke Disability and 5-year Hip-fracture Risk: the Women’s Health Initiative

Carin Northuis, Univ of Minnesota, Minneapolis, MN; Carolyn J Crandall, Univ of California, Los Angeles, Los Angeles, CA; Karen L Margolis, HealthPartners Inst for Education and Res, Minneapolis, MN; Susan J Diem, Kristine E Ensrud, Univ of Minnesota, Minneapolis, MN;
Background: Hip fractures are a significant post-stroke complication. While studies have shown an increased incidence of hip fractures post-stroke, the relationship between stroke-related disability and hip fracture rates are not well characterized. Herein, we examine factors associated with hip fracture risk after stroke using the Women’s Health Initiative (WHI) data.

Methods: The WHI is a prospective study of 161,808 postmenopausal women aged 50-79 years. In the WHI, stroke cases were initially self-reported and then confirmed by a neurologist adjudication using medical records and a manual. Hip fracture cases were self-reported and then radiologically confirmed by physician adjudication. We included stroke survivors from the observational and clinical trial arms who had a Glasgow Outcome Score (GOS) of 1-3 (good recovery, moderately disabled, severely disabled) and survived at least one week after stroke (n=4,640). Survival free from any radiologically-confirmed hip fracture post-stroke was estimated and compared by GOS status. Secondary analysis examined the post-stroke hip fracture risk while accounting for the competing risk of death.

Results: There were 124 hip fractures. Average age of stroke was 74.6 ± 7.2 years. Mean follow-up time was 3.1±1.8 years. Hip fractures by GOS status represented 2.4% (45/1872), 2.5% (34/1366), and 3.5% (45/1278) among good recovery, moderately disabled, and severely disabled. In the competing risk model, 23.3% (1079/4640) of the participants died before the end of follow-up or the occurrence of a hip fracture. Hip fractures by GOS status represented 2.4% (45/1872), 2.5% (34/1366), and 3.5% (45/1278) among good recovery, moderately disabled, and severely disabled. In the competing risk model, 23.3% (1079/4640) of the participants died before the end of follow-up or the occurrence of a hip fracture. Severe recovery (HR: 2.1 (95% CI: 1.3, 3.2), p=0.001) status, but not moderately disabled (HR: 1.1 (95% CI: 0.7, 1.7) p=0.8), was significantly associated with an increase in risk of hip fracture compared to good recovery status. This association was attenuated and not significant for moderately disabled (HR: 1.5 (95%CI: 1.0, 2.3), p=0.06) status when accounting for mortality after stroke. High Hip Fracture Risk Assessment Tool (FRAX) risk (without bone density information), being Caucasian, and increasing age were associated with an increased post stroke hip fracture risk. When accounting for mortality after stroke, higher FRAX-predicted hip fracture risk and race/ethnicity remained significant. The association between age and hip fracture was attenuated and not significant after accounting for post-stroke mortality.

Conclusion: Among stroke survivors, severely disabled status and FRAX-predicted hip fracture risk were associated with a higher risk of subsequent radiologically confirmed hip fracture, but only the FRAX-predicted hip fracture risk association remained significant when considering the competing risk of mortality after stroke. Interventions to reduce fracture risk after stroke should be evaluated in clinical trials.


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Role of Modifiable and Non-modifiable Risk Factors in the Association of Kidney Function With Stroke Risk in Multi-ethnic Study of Atherosclerosis (MESA)

Sanaz Sedaghat, Dept of Preventive Med, Northwestern Univ, Chicago, IL; Michael Bancks, Dept of Epidemiology and Prevention, Wake Forest Sch of Med, Winston-Salem, NC; Ian H. de Boer, Dept of Med, Univ of Washington, Seattle, WA; Holly Kramer, Div of Nephrology and Hypertension, Loyola Univ Chicago, Maywood, IL; Orlando Gutierrez, Depts of Med and Epidemiology Univ of Alabama at Birmingham, Birmingham, AL; WT Longstreth,
Introduction- Persons with chronic kidney disease have up to 8 times higher risk of stroke. A role for shared vascular risk factors, such as aging, sex, hypertension, and diabetes has been implicated in this association. We aim to explore the contribution of non-modifiable and modifiable vascular risk factors to this association.

Hypothesis- We hypothesize that non-modifiable and modifiable vascular risk factors could explain part, but not all, of the association between kidney function and incidence of stroke.

Methods- We included 6404 participants (mean age 62 yrs, 51% women, 38% white). Kidney function was assessed by estimated glomerular filtration rate (eGFR) and albumin-to-creatinine ratio (ACR). Participants were followed for an average of 12±4 yrs for incidence of stroke. Multiple Cox regression models, adjusted for baseline non-modifiable (age, sex and race) and modifiable (BMI, smoking, SBP, diabetes, cholesterol, alcohol intake, physical activity, and healthy diet score) risk factors were used to estimate the association of kidney function with incidence of stroke.

Results- During follow-up, 284 (4.4%) fatal and non-fatal stroke cases were adjudicated. Among them, 233 (3.6%) were non-fatal stroke. Non-modifiable vs. modifiable risk factors were associated with greater reduction in HRs from a crude model for association of each SD lower eGFR with risk of stroke. (25% vs. 12% for non-fatal and 33% vs. 14% for all stroke). Non-modifiable vs. modifiable risk factors were associated with a lower reduction in HRs from a crude model for association of doubling ACR with risk of stroke (6% vs. 12% for both non-fatal and all stroke) (Figure). After adjusting for all factors, worse kidney function remained associated with risk of stroke.

Conclusions- Findings suggest that conventional modifiable and non-modifiable vascular risk factors do not fully explain the higher risk of stroke in relation to worse kidney function. This finding warrants exploring other potential novel mechanisms of this association.


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which points to putative differences of ET-1 by sex. As stroke is the fifth leading cause of death in the U.S., killing approximately 133,000 people per year, more among African Americans (AA), we aimed to identify the sex differences of the association between ET-1 and incident stroke among AA.

Methods: Our AA study participants (N= 4995), with ages 21-90 years and no prevalent stroke, were enrolled in the Jackson Heart Study in Jackson, Mississippi. Stroke events were ascertained through 2011 by reviewing medical records for hospitalizations of JHS participants. Plasma ET levels were measured at the baseline study visit (2000-2004) and expressed in picograms/ml by QuantiGlo Human Endothelin-1 Immunoassay (R&D Systems Inc). Hazard ratios (HR) and 95% confidence intervals (95% CI) were estimated using Cox proportional hazard regression models. Several interactions were assessed such as by sex, smoking and hypertension.

Results: Baseline plasma ET-1 level (mean=1.35, median= 1.30) was significantly lower in women (mean =1.32) than in men (mean =1.40; P-value <0.0001). Sex was not an effect modifier of the association between ET-1 and time to stroke event (p for interaction =0.18). After adjusted for age, ET-1 was associated with reduced risk of stroke [HR (95% CI) for all gender: 0.61 (0.40, 0.94), P-trend=0.015, among men: 0.32 (0.14, 0.72), P-trend=0.003, but not among women: 0.96 (0.54, 1.68), P-trend=0.68, for highest vs. lowest quartile, respectively]. After additional adjustment for hypertension and smoking status, the association was still significant among men [0.35 (0.15, 0.79), P-trend=0.007, for highest vs. lowest quartile, respectively], but not among women. No statistically significant associations were found among both men and women after additional adjustment for BMI, cigarette smoking, anti-hypercholesterolemic medication status, diabetes and hypertension status, cholesterol levels and homocysteine. No interactions by smoking or hypertension were detected.

Conclusion: Our study indicates a non-statistical significant lower risk of stroke with higher levels of endothelin-1, with variation by sex. Our findings warrant confirmation in other epidemiologic studies.


Funding: No

Funding Component:

P405

Racial Disparities in Ischemic and Hemorrhagic Post-stroke Mortality in United States Veterans

Laura Tarko, Yuk-Lam Ho, Lauren Costa, David R. Gagnon, Serkalem Demissie, VA Boston Healthcare System, Boston, MA; Sudha Seshadri, Boston Univ Sch of Med, Boston, MA; Luc Djousse, Kelly Cho, VA Boston Healthcare System, Boston, MA; Peter W.F. Wilson, Atlanta VA Medical Ctr, Decatur, GA; Hugo J. Aparicio, Boston Univ Sch of Med, Boston, MA

Introduction: Blacks and Hispanics have been shown to have higher stroke mortality than non-Hispanic whites. However, this may be due to higher incidence of strokes in blacks and Hispanics. Fewer studies have investigated health disparities in post-stroke mortality stratified by stroke type. We studied risk of mortality by race/ethnicity after either incident acute ischemic stroke (AIS) or intracerebral hemorrhage (ICH) in a national sample of patients from the Veteran’s Health Administration (VHA).

Methods: We included patients with a first occurrence of an inpatient AIS or ICH in a VHA hospital between 2002-2007. We categorized patients as non-Hispanic white, non-Hispanic black, or Hispanic. Veterans with any prior stroke-related
code were excluded. For each of AIS and ICH, we constructed a piecewise multivariate survival model for post event all-cause mortality. We separated follow-up intervals into <30 day, 30-90 day, 90 day-1 year, and >1 year post admission.

Results:
We identified 36,569 patients with an incident stroke in 2002-2007 (91% AIS, 9% ICH). The proportion of white, black, and Hispanic patients with AIS was 68%, 26%, and 6% respectively; and in ICH was 63%, 27%, and 10%. Compared to whites, blacks had better survival for AIS in the first 30 days, while Hispanics tended to have better survival in the 30-90 day and >1 year intervals. With ICH, blacks had higher mortality in the first 30 days. (Table 1)

Conclusion:
Blacks experience better 30-day survival after AIS compared to whites, but worse 30-day survival after ICH. This may be driven by higher prevalence of hypertension in blacks leading to small vessel occlusion, which is associated with lower mortality, or poorer control of blood pressure in the setting of ICH, which is associated with higher mortality. Hispanic patients may have better long-term survival after stroke compared to whites, a ‘Hispanic paradox’ that has been shown in other studies. Stroke events should be stratified by ischemic and hemorrhagic type when evaluating for racial disparities in outcomes.

Table 1. Hazard ratios (95% CI) for post stroke mortality in a piecewise model

<table>
<thead>
<tr>
<th></th>
<th>Ischemic (Black v White)</th>
<th>Hemorrhagic (Black v White)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 day mortality</td>
<td>0.89 (0.73, 1.08)</td>
<td>1.22 (1.00, 1.49)</td>
</tr>
<tr>
<td>30 to 60 day mortality</td>
<td>0.95 (0.84, 1.07)</td>
<td>1.02 (0.85, 1.20)</td>
</tr>
<tr>
<td>90 days to 1 year mortality</td>
<td>1.02 (0.93, 1.12)</td>
<td>0.95 (0.85, 1.06)</td>
</tr>
<tr>
<td>1 year mortality</td>
<td>0.97 (0.93, 1.01)</td>
<td>1.04 (0.96, 1.14)</td>
</tr>
</tbody>
</table>


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Funding Component:

P406

Trajectories of Engagement in Leisure-time Physical Activity and Risk of Incident Ischemic Stroke: the Atherosclerosis Risk in Communities Study

Logan Cowan, Yelena Tarasenko, Georgia Southern Univ, Statesboro, GA; Kelly Evenson, Priya Palta, Univ of North Carolina, Chapel Hill, NC; Kamakshi Lakshminarayan, Univ of Minnesota, Minneapolis, MN

Introduction:
Engagement in leisure-time physical activity (PA) levels recommended by the American Heart Association (AHA) is inversely associated with ischemic stroke risk. PA level can fluctuate over time but the association between PA fluctuations and ischemic stroke risk is unknown. The extent that ischemic stroke risk could be attenuated by increasing PA among those who are inactive could inform stroke prevention.

Hypothesis:
We hypothesize that participants who remained active or increased their PA levels will have lower ischemic stroke risk relative to those who were persistently inactive.

Methods:
We included 12,611 participants of the Atherosclerosis Risk in Communities (ARIC) cohort study ages 45-64 at visit 1 (1987-1989) who did not have a history of stroke at visit 3 (1993-1995). Leisure-time PA was assessed using the modified Baecke questionnaire at visits 1 and 3 and categorized according to the AHA guidelines for PA (ideal, intermediate, or poor). All adjudicated definite and probable incident ischemic strokes between visit 3 and end of year 2013 were included. Cox-proportional hazards regression models were used to estimate hazard ratios (HR) and 95% confidence intervals (CI) for ischemic stroke by cross-categories of PA at visits 1 and 3 using those with poor PA at both visits as the referent group. We adjusted for age, sex, race/center, smoking status, and alcohol intake at visit 3.
Results:
During a median of 18.6 years of follow-up, 777 incident ischemic stroke events occurred. Compared with those with poor PA at visits 1 and 3, participants with ideal PA at both visits had the lowest ischemic stroke risk (HR=0.64, 0.51, 0.80). Those whose PA increased from poor to ideal also had significantly lower ischemic stroke risk (HR = 0.70, 0.53, 0.94).

Conclusion:
Sustained ideal PA was associated with the lowest ischemic stroke risk. Increasing PA between visit 1 and visit 3 was also associated with significantly lower ischemic stroke risk. Increasing PA may be an important component of stroke prevention.


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P407

Stroke Dispatch, Provider Impression and Critical Pre-Hospital Time Intervals: NEMSIS, 2016

Erika Odom, Amena Abbas, Isaac Nwaise, Ctrs for Disease Control and PRE, Atlanta, GA

Introduction
Stroke management guidelines have established several recommendations to ensure a proper response by Emergency Medical Services (EMS), including EMS arrival at the scene in ≤8 minutes (response time, RT), and an on-scene time (OST) of ≤15 minutes. Understanding factors associated with achieving these time intervals may help to focus EMS interventions.

Hypothesis
We assessed the hypothesis that RT and OST for suspected patients with a dispatch of stroke are more likely to fall within guideline recommendations than those with a dispatch for non-stroke related events.

Methods
Using the 2016 National Emergency Medical Services Information System (NEMSIS), a database of patient care reports resulting from 911 calls, we extracted cases with a primary or secondary provider impression of stroke, their EMS arrival to the scene (RT) ≤8 minutes and OST of ≤15 minutes. The sample included persons aged ≥18 years with non-missing sociodemographic data on sex, race/ethnicity, rurality and dispatch calls of events. The percentages of 911 cases, stroke events, and time intervals of interest were calculated. Chi-square tests was used to assess associations.

Results
There were 153,730 events (1.4% of all 911 transports) with a primary or secondary provider impression of stroke. Within these events, 69.5% had a RT ≤8 minutes, and 49.2% had an OST ≤15 minutes: differences varied within all sociodemographic groups. A significant difference was found between those dispatched as stroke and those dispatched as other, with a greater proportion of dispatched strokes having both a RT ≤8 minutes (70.2% vs 68.8%) and OST ≤15 minutes (53.0% vs 45.6%).

Conclusion
In conclusion, we found a significantly higher proportion of patients dispatched as stroke falling within the critical time intervals of response time and on-scene time. Future EMS stroke education should place more focus on dispatcher knowledge of stroke signs and symptoms, as an integral pre-hospital partner in improving the stroke system of care.
Introduction
A positive public health trend in Iowa in the last decade has been the decreasing mortality by stroke. However, there has been an alarming trend in the increased occurrence of stroke in the younger population (≤45 years) in Iowa from 2010-2018. The risk factors responsible for the rising incidence in the young need attention for prevention.

Hypothesis
This analysis examines whether over time young persons with stroke will have a different frequency and distribution of some cardiovascular risk factors at the time of their stroke. Additionally, we analyze if the risk factor prevalence varies by age cohort and if risk factor prevalence differs from the general age-matched population in Iowa.

Methods
Using the Iowa Stroke Registry, data from 22,652 patients from 2012-2017 was collected from 32 hospitals. We investigated demographics, medical, social, and family histories by age (≤45, >45) across time (2012-2017) for ischemic strokes. Statistical analysis was done to determine if for each age cohort a factor varied significantly over time, and if factor prevalence varied between age groups. Comparisons were using Chi-Square tests for categorical variables and ANOVA for continuous variables with an alpha=0.05. Trend of change over time was analyzed. We used Iowa Behavioral Risk Factor Surveillance System data from 2015 to compare prevalence of risk factors among stroke patients and the population.

Results
Compared to over 45 years old stroke patients, 45 or less years old stroke patients in Iowa in 2012-2018 have a higher prevalence at the time of their stroke of obesity, morbid obesity, drug abuse, migraines, a family history of stroke and a smoking history (p=<0.05). There was a lower prevalence of past cardiovascular event, dyslipidemia, hypertension, atrial fibrillation, antiplatelet medication use, anticoagulant medication use, and antihypertension medication use (p=<0.05). Dyslipidemia and hypertension decreased in prevalence among stroke patients over years (R² 0.45, 0.44). Also in comparison to their age-matched Iowa counterparts, Iowa stroke patients have a higher prevalence of smoking, diabetes, prior stroke, prior MI, hypertension, high cholesterol. They have lower diagnosed depression and no difference in obesity.

Conclusions
Younger persons with strokes experience risk factors at different proportions than older
patients with strokes and the prevalence of these risk factors are changing over time. The ≤45 year old stroke patients vary from their overall age-matches state counterparts in their risk factor prevalence. Overall, these findings highlight the need for increased screening and preventive interventions by public health and health care providers.

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P409

Mortality in Subarachnoid Hemorrhage Varies by Day and Month Within the USA

David Rushworth, Baylor Coll of Med, Houston, TX; Amber Mathews, Univ of Houston, Houston, TX; Adil Khan, Baylor Coll of Med, Houston, TX; Paul Litvak, Pitchaiah Mandava, Michael E. DeBakey VA Medical Ctr, Houston, TX

Introduction: High mortality is associated with aneurysmal subarachnoid hemorrhage (SAH). Despite years of studies and translational research, only a few health and lifestyle factors have been found to definitively associate with an increased risk of SAH incidence and mortality. Prior studies have provided some evidence that environmental factors play a role in the incidence of SAH, but the available data is not often consistent or applicable to the United States of America (USA). Here we provide support that there is a temporal differences in SAH mortality by month of the year and day of the week. Methods: The Centers for Disease Control (CDC) and Prevention public health database (wonder.cdc.gov) was accessed. Mortality events for the years 1999-2016 were obtained for deaths attributed to SAH from a named vessel distribution with accounting for day of week and month of year as well as gender from year to year. ANOVA was used to test for differences by week or month. Results: Mortality for week day variations found no significant differences (p = 0.13) in women, while men demonstrated a significant difference (p = 0.003) with the most common day of death being Monday. Mortality for monthly variation found a significant difference (p = 0.01) in total with January being the most common month of SAH mortality. However, divided by gender women (p = 0.06) and men (p = 0.10) did not meet predefined statistical significance. Conclusion: Mortality from SAH appears to have a variation in time of day of week in men and by month for both genders but this has unclear significance at this time.


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P410

Predictive Value of Coronary Artery Calcium for Coronary versus Stroke Events

Anurag Mehta, Emory Univ Sch of Med, Atlanta, GA; Ambarish Pandey, Colby R Ayers, Amit Khera, UT Southwestern Medical Ctr, Dallas, TX; Laurence Sperling, Emory Univ Sch of Med, Atlanta, GA; Moyses Szklo, Johns Hopkins Bloomberg Sch of Public Health, Baltimore, MD; Rebecca F Gottesman, Johns Hopkins Sch of Med, Baltimore, MD; Khurram Nasir, Yale Ctr for Outcomes Res and Evaluation, New Haven, CT; Matthew Budoff, Los Angeles Biomedical Res Inst, Los Angeles, CA; Michael J Blaha, Roger S Blumenthal, Johns Hopkins Ciccarone Ctr for the Prevention of Cardiovascular Disease, Baltimore, MD; Parag H Joshi, UT Southwestern Medical Ctr, Dallas, TX
**Introduction:** Coronary artery calcium (CAC) is a well-established predictor of ASCVD events, which includes both CHD and stroke events. Given the gender and ethnic variation in CHD and stroke incidence rate, we sought to determine the predictive value of CAC for CHD and stroke risk across sex and race sub-groups of a population free of ASCVD.

**Hypothesis:** CAC score is a better predictor of CHD risk than stroke risk and the strength of its association with ASCVD and CHD risk is stronger among men.

**Methods:** Asymptomatic White, Black, and Hispanic participants of Multi-Ethnic Study of Atherosclerosis and Dallas Heart Study had CAC score measured at enrollment (2000-2002) and were followed for incident ASCVD events. ASCVD incidence rate and CHD-to-stroke incidence ratio across CAC score categories (0, 1-100, and >100) was assessed. Association of CAC with events was evaluated using multivariable-adjusted Cox models and multiplicative interactions between CAC and sex/race were tested.

**Results:** Among 7,042 participants (57 years, 54% women, 36% Black, 23% Hispanic, 49% with CAC=0, and 19% with CAC >100) there were 574 ASCVD events (333 CHD, 241 strokes) over a 12-year median follow-up. The CHD-to-stroke incidence ratio increased from <1 with CAC=0 to ≥1.4 with CAC >100 in all participant groups. CAC >0 was independently associated with ASCVD and CHD risk in all groups, with a stronger association observed among men than women (p-interaction <0.05). There were no race-based interactions. CAC >0 was independently associated with stroke risk in the overall sample but not in sex/race groups, and the strength of this association was weaker than what was observed with CHD risk.

**Conclusions:** In these multi-ethnic, population-based cohorts the CHD-to-stroke incidence ratio was higher with higher CAC score, CAC predicted CHD risk better than stroke, and CAC presence had a stronger association with ASCVD and CHD risk among men. These results may inform the utility of CAC testing for specific patient groups and event types where it is most predictive.


**Funding:** No

**Funding Component:**

**P411**

**Does Age at Natural Menopause Influence Changes in Left Ventricular Structure and Function During the Menopausal Transition? The Coronary Artery Risk Development in Young Adults (CARDIA) Study**

**Duke Appiah,** Texas Tech Univ Health Sciences Ctr, Lubbock, TX; Chike C Nwabuo2, Harvard Univ, Cambridge, MA; Imo Ebong, Univ of Chicago, Chicago, IL; Henrique D Vasconcellos, Johns Hopkins Univ, Baltimore, MD; Melissa F Wellons, Vanderbilt Univ, Nashville, TN; Cora E Lewis, Univ of Alabama at Birmingham, Birmingham, AL; Joao A Lima, Johns Hopkins Univ, Baltimore, MD; Pamela J Schreiner, Univ of Minnesota, Minneapolis, MN

INTRODUCTION: The association between menopause and incident cardiovascular disease (CVD) is controversial. Cardiac structure and function are important predictors of future CVD events, however, evidence for the long-term association of age at natural menopause (NM) with cardiac remodeling as women transition through menopause is lacking. We assessed the hypothesis that age at NM will be positively
associated with changes in echocardiographic parameters of left ventricular (LV) structure and function.

METHODS: We studied 771 premenopausal women (37% black) from the Coronary Artery Risk Development in Young Adults (CARDIA) Study with echocardiographic data in 1990-1991 (mean age: 32 years) who later reached NM by 2015-2016 and had additional echocardiogram.

RESULTS: Mean age at NM was 50 years and the average time from menopause to the last echocardiogram was 7 years. In cross-sectional analyses, no associations were found between age at NM and premenopausal baseline parameters of LV structure and function (Table 1). However, a one-year decrement in age at NM was significantly associated with higher postmenopausal levels of LV mass (LVM), LVM indexed to body surface area, LV mass-volume ratio, and relative wall thickness. In longitudinal analyses, higher age at NM was inversely associated with pre-to-postmenopausal changes in LV structure parameters. Controlling for baseline echocardiographic parameters, demographics, smoking, systolic blood pressure, BMI, physical activity, reproductive factors, total cholesterol and pre- to postmenopausal changes in systolic blood pressure, BMI and total cholesterol as well as hormone therapy attenuated the association of age at NM with these LV structure parameters.

CONCLUSION: In this study, premenopausal CVD risk factors explained the association of age at NM with changes in LV structure parameters during the menopausal transition. These data suggest that premenopausal CVD risk factors rather than age at NM may predispose women to elevated future CVD risk.


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Funding Component:

P412

Increased Forward and Backward Arterial Wave Reflections Are Found in Adolescents With Obesity or Obesity-Related Type 2 Diabetes Mellitus

Andrew H Tran, Thomas R Kimball, Phil R Khoury, Lawrence M Dolan, Elaine M Urbina, Cincinnati Children's Hosp Medical Ctr, Cincinnati, OH

Introduction: Pulse wave analysis provides an estimation of central (aortic) pressure and arterial wave reflections which relate to LV dysfunction and risk of CV events in adults. Recent adult studies suggest separation of the forward and backward waves may provide improved risk stratification for CV events. Data in youth are lacking.

Hypothesis: We hypothesized that a significant difference in arterial wave reflections would be identified in young subjects with adverse CV risk factors.

Methods: Vital signs, fasting lipids, glucose, insulin, HbA1c, and CRP were obtained in 551 patients aged 10-24 years in a study comparing vascular health among lean (L= 199), obese (O=173) and subjects with type 2 diabetes (T=179). Wave separation analyses were performed on pressure tracings obtained from
radial artery tonometry. Group differences in CV risk factors and wave reflections were assessed using ANOVA. General linear models were constructed to elucidate independent predictors of wave reflections.

Results: A more adverse CV risk profile was found in O and T subjects compared to L (higher BMI, SBP, DBP, LDL, TG, CRP, lower HDL in O and T vs L; all p<0.0003). The T group had higher glucose, insulin, and HbA1c compared to the L and O groups (all p<0.0001). The forward pulse wave amplitude (Pf) and the backward pulse wave amplitude (Pb) were significantly higher (P<0.0001) in the O and T groups compared to the L subjects (figure). The independent determinants of Pf included age, sex, waist-to-hip ratio (WHR), height, SBP, DBP, and HR (R²=0.24, p<0.0001). Independent determinants of Pb included group, WHR, SBP, HR, and log insulin (R²=0.43, p<0.0001).

Conclusions: Adolescents and young adults with obesity and T2DM have altered forward and backward arterial wave reflections compared to lean controls related to adiposity, BP, and insulin levels. These new parameters may be useful in risk stratifying patients with adverse cardiovascular risk factors.


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Funding Component:

P413

Association Between High Sensitivity Troponin T and N-Terminal Pro B-Type Natriuretic Peptide and Fall Risk in Older Adult Participants of the Atherosclerosis Risk in Communities Study (ARIC)

Stephen P Juraschek, BIDMC-Harvard Medical Sch, Boston, MA; Natalie Daya, Lawrence J Appel, Edgar R Miller III, Kunihiro Matsushita, Erin D Michos, Johns Hopkins Univ, Baltimore, MD; Beverly Gwen Windham, Univ of Mississippi Medical Ctr, Jackson, MS; Christie M Ballantyne, Baylor Coll of Med, Houston, TX; Elizabeth Selvin, Johns Hopkins Univ, Baltimore, MD

Background Many health practitioners worry that treating cardiovascular disease (CVD) risk factors (e.g. blood pressure) could contribute to falls in older adults. While prior CVD is a known risk factor for falls, it is unknown whether subclinical measures of myocardial injury and wall stress are related to falls among older adults without known CVD. Hypothesis Markers of subclinical CVD, i.e. high sensitivity troponin T (hs-cTNT) and N-terminal pro b-type natriuretic peptide (NT-proBNP), are associated with new falls among older adults without known CVD. Methods We examined the prospective association between hs-cTNT and NT-proBNP assessed at visit 5 (2011-2013) in ARIC participants who did not have a history of coronary heart disease, stroke, or heart failure. Falls were identified from hospital discharge ICD-9 codes or CMS claims. We determined fall incidence rates across the following categories approximating quartiles of hs-cTNT (<8, 8-10, 11-16, ≥17 ng/L) and NT-proBNP (<75, 75-124, 125-274, ≥275 pg/mL) via Poisson models adjusted for age, sex, and race. The relative risk between markers and fall risk was modelled via Cox models adjusted for demographic characteristics and fall risk factors. Results In 4,303 participants (mean age 76±5 yrs, 63% women, 24% black), there were 429 new falls during a median follow-up of 4.5 years. Incidence rates across categories of hs-cTNT were 10.9, 16.0, 18.9, and 26.5 per 1,000.
person-years; and incidence rates across categories of NT-proBNP were 8.1, 15.6, 21.5, and 33.0 per 1,000 person-years. Hs-cTNT ≥17 vs <8 ng/L was significantly associated with a higher risk of falls (adjusted HR 2.22, 95%CI 1.56-3.18). Similarly, NT-proBNP ≥275 vs <75 pg/mL was significantly associated with a higher risk of falls (2.46; 1.72-3.51). Associations with fall risk were curvilinear for both markers (Figure).

**Conclusions**
Subclinical CVD was associated with risk of falls in older adults. Further research is needed to delineate mechanisms by which subclinical CVD might contribute to falls.

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**The Interrelations Between Serum Uric Acid, Silent Myocardial Infarction and Mortality in the General Population**

**Background:** Whether elevated uric acid (UA) is associated with silent myocardial infarction (SMI) or whether their joint association predicts an increased risk of mortality has not been explored.

**Methods:** This analysis included 6,323 participants (58.4±13.1 years, 53.9% women, and 49.7% Non-Hispanic whites) without clinical cardiovascular disease (CVD) from the Third National Health and Nutrition Examination Survey (NHANES-III). SMI was defined as electrocardiographic evidence of myocardial infarction (MI) without a history of MI. Multivariable logistic regression model was used to examine the cross-sectional association between baseline UA and SMI. Cox-proportional hazard analysis was used to calculate hazard ratio (HR) with 95% confidence interval (CI) for the risk of all-cause and CVD mortality with UA in the absence and presence of SMI.

**Results:** Higher baseline level of UA was associated with higher odds of baseline SMI. The prevalence of SMI was 0.79%, 1.18%, 1.59% and 2.27% across the UA quartiles respectively; multivariable-adjusted OR (95% CI): 2.53 (1.19-5.37) comparing the upper with lower quartile. During a median follow up of 14 years, there were 1916 all-cause death of whom 774 were CVD deaths. Compared to participants with the lowest UA quartile values and without SMI, those with highest UA had a 34% increased the risk of all-cause mortality (multivariable-adjusted HR: (95%CI): 1.34 (1.15-1.56)). This risk increased by 112% in the presence of SMI (multivariable-adjusted HR (95%CI): 2.12(1.41-3.70)). Similar results were observed for CVD mortality. SMI carried an increased risk of all-cause and CVD mortality only in higher quartiles of UA.

**Conclusion:** The strong association of UA with SMI and the additive effect of UA and SMI on mortality further support the potential role of UA as a marker of poor outcomes. Both UA and electrocardiogram are simple, inexpensive
markers which can potentially be used in risk stratification and identification of high-risk individuals.


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Correlation of Screening Electrocardiogram, Transthoracic Echocardiogram, and ASCVD Risk Score to 10 Year ASCVD Outcomes Among Asymptomatic Community Dwelling Women

Ariane Clare Agdamag, Joanne Michelle Gomez, Nilam P Patel, Maria Isabel Camara, Simisola Alalade, Katherine Khazey, Meghna Patiath, Isabel Kats, Emma Fleisher, Estefania Oliveros Soles, Neelum Aggarwal, Kim Williams, Annabelle Volgman, Rush Univ Medical Ctr, Chicago, IL

Background: The efficacy and value of non-traditional screening methods such as electrocardiogram (ECG) and transthoracic echocardiography(TTE) remain unknown. In this study, we examined the correlation between initial ECG and TTE findings, and atherosclerotic cardiovascular disease (ASCVD) 10 year risk score with actual 10-year ASCVD outcomes among asymptomatic women from a community-based screening program cohort at Rush University Medical Center.

Methodology: A 10-year follow-up survey was conducted in March-September 2018 from the 355 participants from the initial 2BigHearts community screening program in 2007. Demographics, past medical history, ASCVD outcomes (stroke, non-fatal MI, PAD), and self-reported medication lists were obtained from the 107 participants who responded to the survey. Pearson Chi-square Test was used to determine the association of ECG, TTE, and calculated ASCVD risk score with ASCVD outcomes and heart failure (HF).

Results: Amongst the 107 participants (mean age 63+10.6 years, 68.3% (71/104) Caucasian, 18.3% (19/104) African American, 8.6% (9/104) Hispanic, 4.8% (5/104) Asian), 15% (16/107) had baseline TTE abnormality with chamber enlargement as most common while 29.9% (32/107) had baseline TTE abnormality with conduction abnormalities as most common. The mean ASCVD 10 year risk score was 4.02+4.5%. Of the 107, 11 had ASCVD score > 7.5% of which 2 developed non-fatal MI and PAD. Other co-morbid conditions included 29% (31/107) hyperlipidemia, 22.4% (24/107) hypertension, 8.4% (9/107) diabetes, 6.5% (7/107) obstructive sleep apnea and 12.1% (13/107) any type of cancer. Chi-square testing showed no statistically significant correlation between ECG or TTE abnormality with ASCVD outcome. Baseline TTE abnormality was associated with heart failure in 10-year follow-up (p=0.017).

Conclusion: This study found no association between abnormal screening ECG and TTE findings with 10-year ASCVD outcomes (stroke, non-fatal MI, PAD). However, abnormal TTE findings are associated with HF. ASCVD pooled cohort equation proved to be better than ECG and TTE in predicting ASCVD outcomes.
Objectively Measured Snoring is Not Associated With Maladaptive Arterial Remodeling in Overweight and Obese Adults

Christy Taylor, Univ of Pittsburgh Sch of Med, Pittsburgh, PA; Christopher Kline, Univ of Pittsburgh Sch of Education, Dept of Health and Physical Activity, Pittsburgh, PA; Chunzhe Duan, Emma Barinas-Mitchell, Univ of Pittsburgh Sch of Public Health, Pittsburgh, PA

Introduction: We previously reported that snoring severity was related to carotid arterial remodeling as characterized by wider inter-adventitial diameter (IAD) and greater intima-media thickness (IMT) in overweight and obese adults without obstructive sleep apnea (OSA). Considered to be an adaptive mechanism to maintain circumferential wall and shear stress homeostasis and a natural process in the setting of aging, early arterial remodeling is associated with cardiovascular morbidity and mortality. Elevations in arterial circumferential wall tension (CWT) and stress (CWS) in the setting of this compensatory arterial remodeling is considered maladaptive. We aimed to examine the association between snoring severity and CWT and CWS in adults with or without OSA.

Methods: Cross-sectional analyses were conducted using 24-month follow up data from the Slow Adverse Vascular Effects lifestyle intervention study. The original population consisted of 349 overweight/obese (BMI 25-40 kg/m²) adults aged 20-45 years old without hypertension or diabetes. The snoring index (SI) and oxygen desaturation index (ODI) were measured by the ResMed ApneaLink device among 122 participants. Snoring/OSA was categorized into three groups: OSA (ODI≥5; n=41), heavy snoring (ODI<5, median SI; n=40), and low snoring (ODI<5, below-median SI; n=41). B-mode carotid ultrasound was used to measure end-diastole mean common carotid artery (CCA) IMT and lumen diameter (LD). Mean CWT (kPa*mm) and CWS (kPa) were calculated using Laplace’s law: CWT=MAP*(LD/2) and CWS= CWT/IMT; CCA wall to lumen ratio (WLR) = IMT/ LD. We used multiple linear regression to assess the association between snoring/OSA categories and CWT, CWS, and WLR adjusting for intervention group, age, sex, race, pulse pressure, BMI, non-HDL cholesterol, and fasting glucose.

Results: Participants were, on average, 40.1 ± 5.9 years old with a BMI of 31.6 ± 4.4 kg/m²; 76.2% were women and 82% were white. Most CVD risk factors differed across snoring/OSA categories, including age, BMI, lipids, and fasting glucose, with risk factors worse in the OSA and heavy snoring groups compared to the low snoring group (all p <0.05). In unadjusted analyses, CWT was higher in both heavy snoring (32.71 ± 4.74) and OSA (33.74 ± 5.09) groups compared to the low snoring group (29.94 ± 4.51; all p<0.01). Differences were also noted in WLR between the low snoring and OSA groups (0.11 ± 0.01 vs. 0.12 ± 0.02; p<0.05). Between-group differences in CWT were attenuated (p=0.09) and eliminated in WLR after multivariable adjustment. Differences in CWS across snoring/OSA categories were not observed.

Conclusion: Our findings suggest that, in overweight and obese young to middle-aged adults without hypertension or diabetes, objectively measured snoring may not be associated with maladaptive arterial remodeling after accounting for traditional CVD risk factors.

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P417

Association of Breast Arterial Calcification Presence and Severity with Cognitive Function: The MINERVA Study

Carlos Iribarren, Meng Lu, Kaiser Permanente, Oakland, CA; Sabee Molloi, UC Irvine Sch of Med, Dept of Radiological Sciences, Irvine, CA; Gabriela Sanchez, Kaiser Permanente, Oakland, CA; Fatemeh Azamian-Bidgoli, UC Irvine Sch of Med, Dept of Radiological Sciences, Irvine, CA; Hyo-Min Cho, Dept of Radiological Sciences, UC Irvine Sch of Med, Irvine, CA; Huanjun Ding, UC Irvine Sch of Med, Dept of Radiological Sciences, Irvine, CA; Kristine Yaffe, Dept of Psychiatry, UC San Francisco, San Francisco, CA

Mammographic Breast arterial calcification (BAC) may be a novel subclinical cardiovascular disease (CVD) risk marker. Since subclinical and clinical CVD are associated with cognitive impairment, we set out to investigate whether there is a relation between BAC presence/severity and cognitive function (CF). We used data from the Multilethnic study of breast arterial calcium gradation and cardioVascular disease (MINERVA), a multiethnic cohort of women aged 60-79 at baseline (10/2012 and 2/2015) who were free of symptomatic CVD, all recruited at Kaiser Permanente of Northern California. The sample available for analyses with complete data on BAC, cognitive function and covariates was 3,919 (mean ± SD age=67 ± 4, 52% white, 18% Asian, 15% African-American and 12% Latina). A BAC continuous mass score (mg) was obtained using a validated densitometry method. BAC presence was BAC score > 0 mg, and severe BAC was BAC score > 20 mg. CF was dichotomized as Montreal Cognitive Assessment (MoCA) score < 23 (first quartile) vs ≥ 23 (quartiles 2, 3 and 4). The unadjusted (Model 1) odds ratios (OR, 95% CI; p-value) of CF < 23 vs. ≥ 23 associated with BAC > 0 vs. BAC=0 was 1.15 (0.98-1.35; 0.08). However, adjustment for age, race and education (Model 2) abolished this association. Further adjustment for factors independently predicting CF (Model 3, with further inclusion of diabetes, HDL-C, CES depression score, breast feeding, multiple sclerosis and osteoarthritis) did not change the association. The unadjusted (Model 1) odds ratios (OR, 95% CI; p-value) of CF < 23 vs. ≥ 23 associated with BAC > 20 vs. BAC≤ 20 was 1.44 (1.02-2.01; 0.04). However, adjustment for age, race and education (Model 2) abolished this association and further adjustment for factors independently predicting CF did not alter the association. In conclusion, we found a statistically significant association between severe BAC and CF, but it was explained by covariation (confounding) by age, race and education, arguing that BAC may not play a role in cognitive impairment.


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Association of Cardiometabolic Risk Factors on Left Ventricular Hypertrophy and Diastolic Dysfunction in Mexican Americans

Miryoung Lee, UTHealth, Sch of Public Health, Brownsville, TX; Neha M Paul, UTHealth, McGovern Medical Sch, Houston, TX; Susan P Fisher-Hoch, Joseph B McCormick, UTHealth, Sch of Public Health, Brownsville, TX; Susan T Laing, UTHealth, McGovern Medical Sch, Houston, TX
Left ventricular diastolic dysfunction (LVDD) and left ventricular hypertrophy (LVH) are key components of clinical diastolic heart failure, and are associated with obesity, hypertension and diabetes mellitus (DM), which are highly prevalent in Mexican Americans. Our study aim was to determine the prevalence of subclinical left ventricular abnormalities (LVH and LVDD) and how cardiometabolic risk is associated with them in a sample of Mexican Americans in south Texas. **Methods:** Demographic, metabolic biomarkers, and body composition data were obtained in 591 participants (66.2% females, mean age 54.0±1.1 years) from a community-based Cameron County Hispanic Cohort study. LVH and LVDD were evaluated from echocardiography using national guidelines. Abdominal adiposity was determined by waist circumference (WC) or abdominal visceral fat mass (VAT) from dual energy X-ray absorptiometry. Weighted ordinal logistic regression analyses were conducted comparing individual (LVH only or LVDD only) or joint (LVH and LVDD both) outcome groups to normal groups while adjusting for demographic and clinical covariates. **Results:** Weighted prevalence rates of obesity (45.4%), DM (29.5%), hypertension (49.6%), LVH (31.0%) and LVDD (21.3%) were high in the sample studied. BMI (p=0.03) and WC (p<0.01), but not VAT, were significantly related to LV abnormalities in models adjusted for age and gender. WC, but not BMI, was statistically significant (p<0.01) in models further adjusted for cardiometabolic conditions. WC was related to higher odds of having LVH [OR=1.03 (1.01, 1.05)]. Having high cholesterol was associated with having LVH and LVDD jointly [OR=2.5 (1.2, 5.2)]. Hypertension was robustly associated with LVDD (p<0.05). Participants who were hypertensive were 2.3 times (95%CI 1.1-4.9) more likely to have LVDD than normotensive subjects. **Conclusion:** There is a high prevalence of Stage B heart failure among Mexican Americans with 39% showing LVDD and/or LVH. This study presents evidence of independent differential relationships of abdominal adiposity, dyslipidemia, and hypertension on LVH and LVDD in this asymptomatic Mexican American cohort. Targeted intervention strategies to control individual cardiometabolic risk factors is important to prevent early cardiac abnormalities.

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**Migraine and Arterial Stiffness in the Brazilian Longitudinal Study of Adult Health ELSA-Brasil**

**Cristina P Baena,** Patricia Appelbaum, PUCPR, Curitiba, Brazil; Paulo Andrade Lotufo, Itamar S Santos, Univ de São Paulo, São Paulo, Brazil; Alessandra C Goulart, Univ de São Paulo, Sao Paulo, Brazil; Isabela M Benseñor, Univ de São Paulo, Curitiba, Brazil

**Introduction** Migraine with aura has been associated with cardiovascular events however the mechanisms are unclear. Arterial stiffness is a validated predictor of cardiovascular events and could play a role in that association. **Hypothesis** We tested the hypothesis that migraine is associated with arterial stiffness in a well-defined middle-aged population. **Methods** In a cross-sectional analysis of a well-defined population with complete and validated information about migraine and aura according to International Headache Society criteria, the arterial stiffness measured by carotid-to-femoral pulse wave velocity was tested with multiple linear regression models comparing migraine without aura (MO) and migraine with aura (MA) to the reference group no migraine (NM). Subsequent adjustments were made for age, sex, education, physical activity, alcohol use, diabetes, smoking, use of anti-hypertensive medication, waist circumference, LDL-cholesterol and triglycerides levels to test the
independence of the association between migraine status and arterial stiffness. Results We studied 4649 participants, 2521 women (25.7% MO and 15% MA) and 2128 men (11% MO and 4.3% MA). NM, MO and MA presented mean age 52.3 ± 9.2, 49.2 ± 7.7 and 47.9 ± 7.1 years respectively (P<0.001 for trend); mean systolic blood pressure 120.9 ± 16.5, 117.3 ± 14.9 and 115 ± 15.2 mmHg respectively (p<0.001 for trend); mean fasting glucose 112.5 ± 29.3, 108.9 ± 30.7 and 103.1 ± 24.6 mg/dl respectively (p<0.001 for trend). Hypertension and diabetes were less prevalent in MA compared to NM (25.5% vs 33 %) and (17.4% vs 21.3%) (p<0.001 for both) and arterial stiffness was not significantly different across groups 9.22 ± 1.8, 9.28 ± 1.9 and 9.26 ± 2 m/s, respectively (p=0.746 for trend). Fully adjusted models yielded non-significant linear coefficients β (CI95%) 0.43 (-0.105;0.191) m/s when MA was compared with NM. Conclusion In a large population of middle-aged with validated aura information, migraine status was not associated with arterial stiffness measured by carotid-to-femoral pulse wave velocity.


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Chronic Pain in Adolescents and Adults With Congenital Heart Disease

Lina Brou, Lindsey Duca 80045, Lisa Mckenzie, Colorado Sch of Public Health, Aurora, CO; Christopher Rausch, Div of Cardiology, Dept of Med, Univ of Colorado Anschutz Medical Ctr, Aurora, CO; Amber Khanna, Dept of Med, Univ of Colorado Anschutz Medical Campus, Aurora, CO; David Kao, Div of Cardiology, Dept of Med, Univ of Colorado Anschutz Medical Ctr, Aurora, CO; Tessa Crume, Colorado Sch of Public Health, Aurora, CO

Introduction: Chronic pain is a significant public health concern in the U.S., estimated to affect nearly 100 million people. While post-surgical pain associated with treatment of congenital heart disease (CHD) has been studied, the persistent prevalence of chronic pain among this growing population is unknown.

Hypothesis: Our primary objective is to understand the burden of chronic pain among adolescents and adults with CHD in the Colorado Congenital Heart Defects Surveillance System (COCHD). Additionally, we will determine if chronic pain among individuals with CHD is associated with differing patterns of healthcare utilization and mental health diagnoses.

Methods: We included 9,116 participants aged 11 to 64 years with a CHD lesion listed as a diagnostic code on an encounter occurring between January 1, 2011 to December 31, 2013. Chronic pain was defined as an encounter with ICD-9CM code (338.2-338.4) from a validated algorithm for identifying chronic pain in electronic medical record. Multivariable logistic regression was conducted to assess associations between chronic pain and the number of inpatient visits, cardiac procedures and mental health disorders, adjusted for CHD severity and age group.

Results: Of the 9,116 participants identified with CHD between 2011-2013 in COCHD, 17.5% met the diagnostic criteria for chronic pain. Table 1 displays the differences in our cohort by chronic pain status. Chronic pain was associated with a 54% increase in the likelihood of a mental diagnosis (OR=1.54, 95%C.I.:1.43-1.66) and each increasing number of cardiac procedures that occurred during the 3 year study interval increased the likelihood of chronic pain by 25% (OR=1.25, 95%C.I.:1.21-1.30).

Conclusion: Our study provides novel insight into the increasingly recognized public health issue of chronic pain within the growing
population of adolescents and adults with CHD who have high lifetime healthcare utilization. Further studies will explore the complex relationship of mental illness, chronic pain and CHD.

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**Cardiovascular Death Trends in Minnesota From 2000-2017**

Yariv Gerber, Susan Weston, Sheila Manemann, Suzette Bielinski, Alanna Chamberlain, Jill Killian, Chandrasagar Dugani, Veronique L Roger, Mayo Clinic, Rochester, MN

Background: The decline in cardiovascular disease (CVD) mortality in the United States noted since the mid 1970s has recently leveled off. This has generated concern and a need for further analyses to understand geographic variation, cause-specific deaths, location of death, and age-specific trends. Methods: Death certificate data obtained from the Minnesota Department of Health were used for analysis. The American Heart Association (AHA) classification was applied to the underlying cause of death to generate the following CVD categories: coronary heart disease (CHD), non-CHD diseases of the heart, and non-cardiac circulatory diseases. Temporal trends in death rates were explored by negative binomial regression, which enables estimates of age- and sex-adjusted average annual percentage changes (AAPCs). Differences in AAPCs between 2000-2009 and 2010-2017 were tested overall and across demographic, CVD, and location of death categories. Results: CVD mortality rates, which were declining in 2000-2009, have leveled off in 2010-2017 (Table). These trends were observed across all subgroups. After adjusting for sex, the age group that drove the decline in rates from 2000-2009 was the 65-84 year old group, which experienced no change in rates from 2010-2017. Across CVD categories, after adjusting for age and sex, the decline in rates from 2000-2009 was largely attributable to steep reductions in CHD and non-cardiac circulatory diseases, with lesser reduction in non-CHD diseases of the heart. In 2010-2017, CHD and non-cardiac circulatory diseases rates showed no change, whereas the rate of non-CHD diseases of the heart increased. The rates for in- and out-of-hospital deaths improved in 2000-2009 with no further improvement observed in 2010-2017. Conclusions: CVD mortality rates are no longer declining in Minnesota, paralleling national trends. These trends are particularly concerning for non-CHD diseases of the heart.
Accelerometer-Determined Sedentary Time and Physical Activity Across Employment Status Categories in CARDIA

Tyler D Quinn, Univ of Pittsburgh, Pittsburgh, PA; Kelley Pettee Gabriel, UT Austin, Austin, TX; Juned Siddique, David Aaby, Northwestern Univ, Chicago, IL; Kara Whitaker, Univ of Iowa, Iowa City, IA; Abbi Lane-Cordova, Univ of South Carolina, Columbia, SC; Steve Sidney, Barbara Sternfield, Kaiser Permanente Div of Res, Oakland, CA; Bethany Barone Gibbs, Univ of Pittsburgh, Pittsburgh, PA

Prolonged sedentary behavior and insufficient physical activity is a common activity profile, especially in modern workplaces. Describing activity profiles by employment status groups could identify target populations for sedentary and activity intervention. Methods: This cross-sectional analysis of Year 20 CARDIA data (2005-6), included participants who had valid accelerometry data (≥4 days with ≥10 hours), reported occupational status, and were not currently a student (n=2,068). Uniaxial accelerometry data (ActiGraph 7164) were expressed in 60 second epochs and summarized as: average counts per minute (cpm) and time spent (min/day) in prolonged sedentary behavior (≥30 continuous minutes, SED≥30), less than 30-minute bouts of sedentary behavior of (SED<30), light physical activity (LPA), less than 10-minute bouts of moderate-to-vigorous physical activity of (MVPA≥10), and bouted MVPA (≥10 minutes, MVPA≥10) using Freedson cutpoints. Employment status was self-reported as full-time, part-time, unemployed/looking for work, keeping house, or raising children. Omnibus group differences were analyzed using ANCOVA adjusted for sex, race, age, education, wear time, center, and BMI. Least square means of activity time across groups were calculated and standardized to population average wear time (14.8 hours). Results: Figure 1 shows activity profiles of employment groups rank ordered by cpm. Cpm and most types of activity differed modestly but significantly across employment groups, except for MVPA≥10. Unemployed participants had the highest cpm, the most MVPA≥10 and SED≥30, but the least SED<30. Participants working part-time had the most MVPA<10. Full-time workers had the least LPA. Those raising children had the least SED≥30 and MVPA≥10, but the most LPA. Participants keeping house had the least cpm and MVPA≥10. Conclusions: Public health intervention programing could consider differences in activity profiles across employment status groups.
Longitudinal Participation in the American Heart Association's Workplace Health Achievement Index is Associated With Improvements in Workplace Culture of Health

Chris Calitz, Remy Poudel, Adela Santana, American Heart Association, Dallas, TX; Ross Arena, Univ of Chicago, Chicago, IL; Donna Arnett, Univ of Kentucky, Lexington, KY; Mark Boquet, The Dow Chemical Company, Midland, MI; Steven Driver, Northwestern Univ, Chicago, IL; Vincent Fonseca, Intellica Corp, San Antonio, TX; Jeff Harris, Univ of Washington, Seattle, WA; Khurram Nasir, Yale Univ, New Haven, CT; Keshia Pollack, Johns Hopkins Univ, Baltimore, MD; Emily Smith, Laborers' Health & Safety Fund of North America, Washington, DC; Shelly Wolff, Willis Towers Watson, Stamford, CT; Eduardo Sanchez, American Heart Association, Dallas, TX; Gregg C. Fonarow, UCLA Sch of Med, Los Angeles, CA

Background
In 2016 the American Heart Association (AHA) launched the Workplace Health Achievement Index (WHAI) to increase implementation of 55 evidence-based policies, programs, and environmental supports (PPE) that promote a workplace culture of health. The WHAI is a voluntary online assessment where the total score is derived from the total PPE score and points for performance metrics based on Life’s Simple 7 data. The total PPE score is comprised by points awarded in 7 science-based domains: Leadership, Organizational and Environmental Policies, Communications, Programs, Engagement, Partnerships, and Reporting Outcomes. To date, companies have had the opportunity to complete the WHAI for three cycles (2015-2016, 2016-2017 and 2017-2018). Over 1,000 companies have completed at least one assessment and 135 companies have participated in all three cycles.

Research Questions
The purpose of this analysis was to answer three research questions: (1) Is annual participation associated with improved workplace culture of health as measured by the PPE total score?; (2) which WHAI domains are associated with the most improvement?; and (3) do results vary by company size?

Methods
Data for the 135 companies that participated all three years were assessed. Longitudinal data from this convenience sample were analyzed for the period 2016-2017 and 2017-2018. Mean PPE total scores and domain sub-scores were tabulated to evaluate changes in performance using a linear mixed effects model. Due to the relatively low sample size, data were stratified by two company size categories: smaller (<250 employees) vs. larger (≥ 250 employees). Companies with missing PPE answers were excluded from analysis (n=15).

Results
From 2016-2017, companies with complete data (N=120) significantly increased their mean PPE total score by 8.3 points (p=0.038; max points = 151). Total PPE score increased 6 points during 2017-2018; however, improvement was not statistically significant (p=0.167). Moreover, increases were significant (p<0.05) for all 7 domains during 2016-2017 whereas only 2 domains (Organizational and Environmental Policies, and Partnerships) were significant (p<0.05) the following year. Larger companies (n=97) demonstrated higher mean increases across both time periods (8.4 and 6.1, respectively) compared to smaller companies (n=23) (8.1 and 5.3, respectively); however, results were not statistically significant in both time periods for large companies (p=0.075 and p=0.24, respectively) and smaller companies (p=0.41 and p=0.86, respectively).
Implications
Annual participation in the WHAI is associated with initial improvements in PPE measures with tapering in further improvements during the second year of tracking. Further efforts and resources, perhaps tailored by company size, are needed to facilitate additional enhancements in company performance over time.

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P424

Worksite Food Purchases Are Associated With Employees’ Overall Dietary Intake and Health


Introduction: Most Americans spend half their waking hours at work. We hypothesized that the healthfulness of worksite food purchases was associated with employees’ overall dietary intake and cardiometabolic health.

Methods: Participants were 602 hospital employees who regularly used worksite cafeterias and enrolled in a worksite nutrition study in 2016-18. All hospital cafeterias used traffic-light labels (green = healthy, yellow = less healthy, red = unhealthy). We calculated the proportion of participants’ green- and red-labeled items purchased during a 3 month baseline period. Participants completed 2 online Automated Self-Administered 24-hour dietary recalls used to calculate a baseline Healthy Eating Index (HEI) score (range 0-100, higher = healthier diet). Additional baseline measures included BMI, blood pressure (BP), and HbA1c. Hypertension (HTN) and prediabetes/diabetes (pre-DM/DM) diagnoses were determined by self-report and/or medication use and/or baseline measures (HTN: systolic BP ≥ 150 mmHg or diastolic BP ≥ 90 mmHg; pre-DM/DM: Hb A1c ≥ 5.7). Linear and logistic regression analyses examined differences in HEI scores and cardiometabolic variables by tertiles of green- or red-labeled purchases, adjusting for age, sex, race, ethnicity, education, and number of purchases.

Results: Mean age of participants was 43.6 yrs; 79% (N=478) were female and 81% (N=488) white. Mean BMI was 28.3 kg/m² (SD: 6.5), 63% (N=377) were overweight/obese, 21% (N=124) had HTN, and 27% (N=160) had pre-DM/DM. Mean number of items purchased during the observation period was 112 (SD: 21); mean baseline HEI score was 60.4 (SD: 12.5). The table shows that proportions of green and red items purchased were associated with diet quality (HEI score) and cardiometabolic risk (BMI, HTN, DM).

Conclusions: Food purchases at work were associated with employees’ overall diet quality and cardiometabolic risk factors. Results suggest that interventions to promote healthier worksite food choices have potential to impact overall health.
Introduction

Previous literature shows an “appeared linear dose-response between activity levels and HDL cholesterol levels” However, long duration physical activity may decrease HDL and LDL cholesterol. Intensity may better dictate the change in cholesterol.

Methods

Group 18 of My Unlimited Potential (worksite wellness program for Baptist Health South Florida Employees) performed a preprogram fitness assessment that included resting, testing, and post-test physiological values such as blood pressure and resting HR. Anthropometric measures such as height, weight, 7 and 6 site girth measurements for men and women. Percentage of body fat using Bio electric impedance. The cardiovascular assessment consisted of a $V_{\text{max}}$ (Velocity Max) test on the treadmill. The participants received an exercise prescription (ERX) based on the fitness assessment. Group 18 used the speed and grade of the cardiovascular portion of the fitness assessment to create an ERX. During the course of the 12 weeks $V_{\text{max}}$ was reassessed every 2 weeks to determine a new intensity for cardiovascular exercise. The exercise protocol during the first 12 weeks consisted of 20 minutes of interval cardiovascular training and 40 minutes of whole body gross movement resistance training two times a week. The length of each high intensity interval was determined by the participant’s own tolerance. Resistance training consisted of whole body gross movements, the use of free weights and a metabolic exercise, at the individuals ERX.

Results: Independent sample t-test showed mean improvement of 3.2 points in group 18 when compared to other cohorts (Table 2). Adjusted regression analysis where dependent variable was HDL showed improvement when compared to other groups (Table 3).

Discussion

With $V_{\text{max}}$ the intensity is given in a clear speed and incline that must be achieved irrelevant of the interval length performed during cardiovascular activity. We have had 18 total cohorts complete 12 weeks. Only group 18 had a significant increase in HDL. Only group 18 followed this protocol.


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Association Between Neighborhood Characteristics, Personal Resilience, and Arterial Stiffness Among Blacks: Results From the Morehouse-Emory Cardiovascular (MECA) Center for Health Equity

Jeong Hwan Kim, Matthew L Topel, Tené T Lewis, Emory Univ, Atlanta, GA; Peter Baltrus, Morehouse Sch of Med, Atlanta, GA; Chang Liu, Yi-An Ko, Emory Univ, Atlanta, GA; Mahasin Mujahid, Univ of California Berkeley, Berkeley, CA; Viola Vaccarino, Emory Univ, Atlanta, GA; Mario Sims, Univ of Mississippi, Jackson, MS; Mohamed Mubasher, Morehouse Sch of Med, Atlanta, GA; Ahsan Khan, Kiran Ejaz, Charles Searles, Emory Univ, Atlanta, GA; Sandra B Dunbar, Emory Univ Sch of Nursing, Atlanta, GA; Priscilla Pemu, Herman Taylor, Morehouse Sch of Med, Atlanta, GA; Arshed A Quyyumi, Emory Univ, Atlanta, GA

Introduction: Arterial stiffness is associated with cardiovascular (CV) risk factors and adverse cardiovascular events. While inter-racial differences in arterial stiffness have been reported, factors contributing to intra-racial differences within Blacks are less known. We examined whether neighborhood characteristics and personal resilience factors were associated with arterial stiffness among Blacks.

Hypothesis: More desirable neighborhood characteristics and greater personal resilience are associated with reduced arterial stiffness.

Methods: We examined 385 Black adults (age 53 ± 10, 40% male) without known CV disease living in Atlanta, GA. Arterial stiffness was measured as augmentation index (AIX) and pulse wave velocity (PWV) using applanation tonometry (Sphygmocor Inc). Perceived residential neighborhood characteristics in 7 domains: aesthetic quality, walking environment, safety, food access, social cohesion, activity with neighbors, and violence were determined. Personal resilience was also assessed using standard questionnaires on experience of discrimination, environmental mastery, purpose in life, optimism, resilient coping, and depressive symptoms. Multiple linear regression models were used to examine the differences of arterial stiffness between the highest and the lowest tertiles of neighborhood characteristics and personal resilience factors after adjustment for age, gender, systolic blood pressure, body mass index, household income, education, marital status, and employment status.

Results: Higher composite scores of neighborhood characteristics were associated with lower AIX (β=-3.42, 95% CI [-6.42 to -0.41], P=0.026; highest vs lowest tertiles). Specifically, higher scores of safety (β=-4.26, 95% CI [-7.34 to -1.17], P=0.007) and social cohesion (β=-4.62 [-7.64 to -1.61], P=0.003) were associated with lower AIX (highest vs lowest tertiles for both). For factors of personal resilience, higher scores in purpose in life (β=-4.89 [-7.88 to -1.90], P=0.001) and resilient coping (β=-3.26 [-6.36 to -0.15], P=0.040) were significantly associated with lower AIX (highest vs lowest tertiles for both). There were no significant associations between PWV and scores of neighborhood characteristics or personal resilience factors.

Conclusion: In a study examining the impact of neighborhood and markers of resilience on arterial stiffness in an exclusively Black cohort, we found that better neighborhood characteristics and personal resilience factors were associated with lower pulse wave reflections (AIX).


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