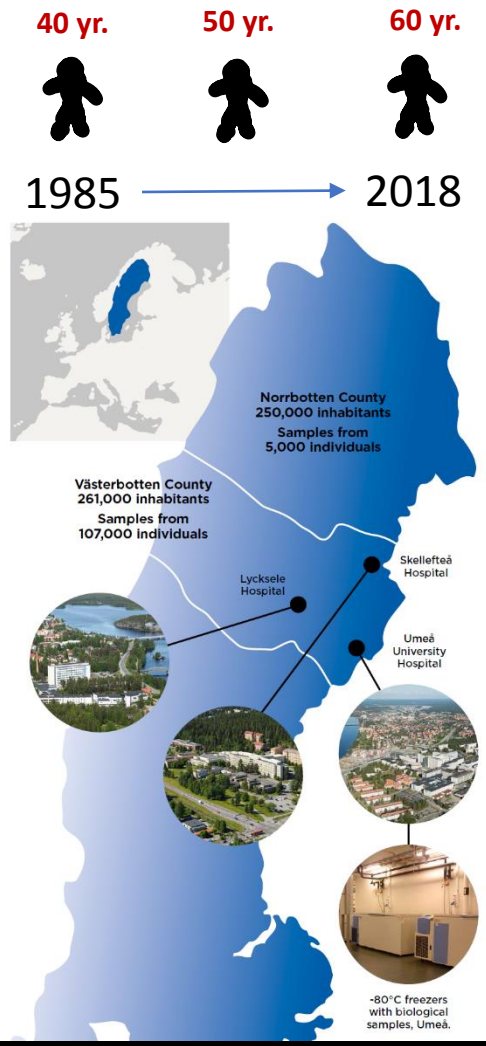
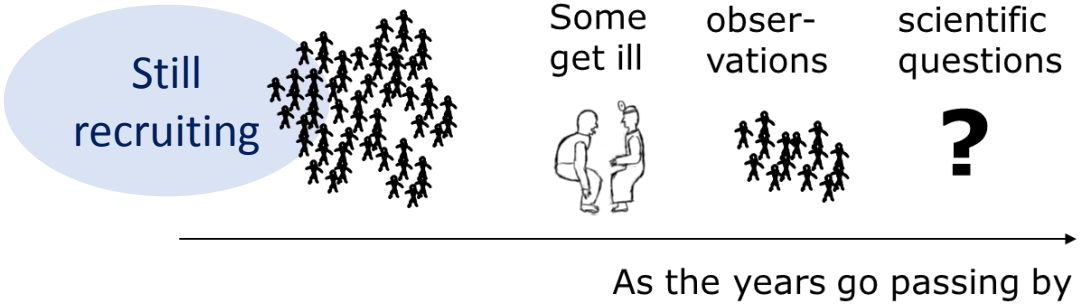
Västerbotten Intervention Programme

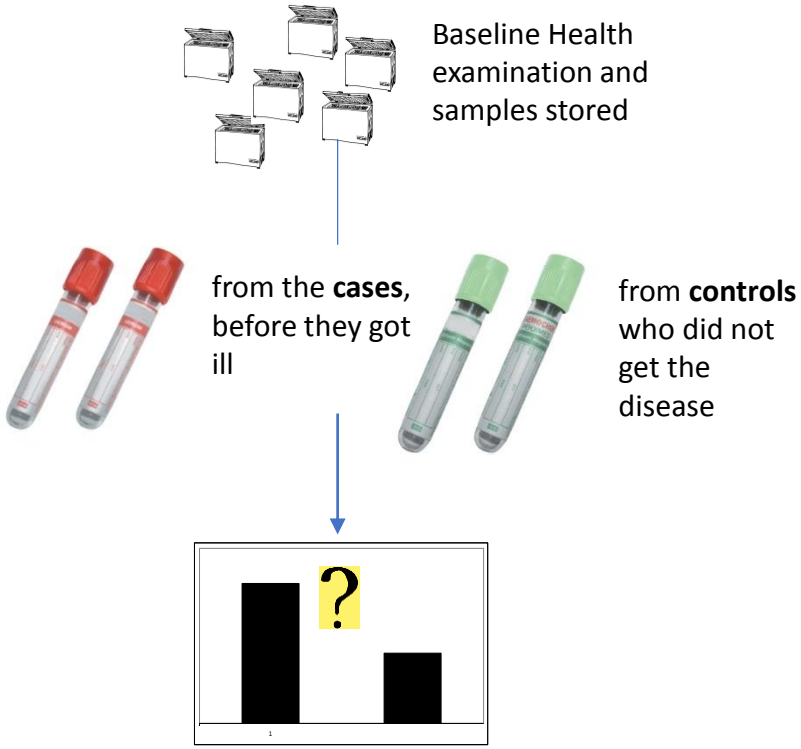




N ~125,000 (**60-70% participation**)
~ 150,000 occasions
~ 5,000 new occasions/year

- Based on continuous population-based health examinations
  - Anthropometric measurements
  - Medical examination
  - Questionnaire on lifestyle and diet
  - Blood samples
  - Glucose tolerance test

Case-control studies in a biobank



Strengths

- Large coverage
- Linkage to patient registers
- Repeated sampling (e.g. pre and post-diagnosis)

- Blood samples and diet and lifestyle questionnaires are collected with a **10-yr interval**
- VIP samples from 1997-2005 are also part of the **EPIC Project**
- Access to biobank samples and/or **data is open** to researchers

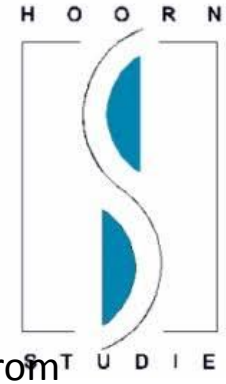
VIP is a public health intervention run by the County Council of Västerbotten with the aim of reducing morbidity and mortality from CVD and diabetes. Participants are asked if they want to donate blood for research, and most participants do so. This annually generates samples from ~ 5,000 individuals, of which ~ 2,000 are entering the study and ~ 3,000 have left one or more samples before

Santiago Longitudinal Study

- **Location:** Santiago, Chile; established: 1991; n=1,798
- **Aim:** Preventive Trial to Prevent Iron-Deficiency Anemia in Infants
- **Original Principal Investigator:** Betsy Lozoff, MD
  - Behavioral/Developmental Pediatrician
  - **Inclusion criteria:** Full term infants; 6 months of age; singleton birth; >3kg birth weight; no congenital abnormalities or complications, no previous iron therapy
- **Collaborating Institutions:** University of Michigan; University of California, San Diego; Universidad de Chile; Instituto de Nutrición y Tecnología de los Alimentos (INTA); University of North Carolina, Chapel Hill
- **Projects/sub-studies**:
  - *Biopsychosocial Determinants of Obesity and Cardiovascular Risk* (PI: **Sheila Gahagan**, MD, MPH)
  - *Neuromaturational Delays in Iron Deficient Anemic Infants* (PI: multiple; Lozoff; **Gahagan**)
  - *Fatty Acids, Adiposity and Cardiometabolic Risk in Adolescence* (PI: multiple; **Gahagan**; Eduardo Villamor, Dr. PH, MD)
  - *Genetic and Environmental Determinants of Obesity and Cardiovascular Risk across the Lifecourse: The Santiago Longitudinal Cohort Study* (PI: multiple; **Gahagan**; Kari North, PhD)

UNIVERSIDAD DE CHILE

The Hoorn Studies



- **Purpose**: To investigate **impaired glucose metabolism, diabetes** and diabetes-related complications in a predominately Caucasian population.

- **Participants:** aged 40-75y recruited in two time periods 1989-1991 and 2006-2007 from Hoorn, a medium-size town in the West-Friesland region of the Netherlands. In total, 5291 participants, 54% men joined the baseline visit.

- **Design and measures**: We determined glucose metabolism, anthropometrics, blood plasma lipid levels, renal function, blood pressure, family history of diabetes, several self-reported SES and behavioral measures. In a subgroup, follow up included assessment of **diabetes complications retinopathy, nephropathy, autonomic or peripheral nervous system dysfunction**, cardiac and vascular structure and function. For each participant, several samples of DNA, plasma, serum, citrate and urine are stored in our biobank for future use.

- **Unique features**: Prospective design with **long follow-up between 10-25 years**. Another strength is the use of **oral glucose tolerance testing and HbA1c** for detection of pre-diabetes and the availability of many vascular risk factors, such as intima-media thickness, ankle-brachial index, vascular stiffness and cardiac function.

The National Health Insurance Service-National Health Screening Cohort (NHIS-HEALS) in Korea

Purpose: To offer useful data for health researchers, especially in the field of NCDs and their risk factors.

Participants: A total of 514,866 people aged 40-79 years and completed general health screening in 2002-2003. This is a 10% random sample of all screened persons.

Available data: Demographics, Income level, Health behaviors, Health service uses, and Cause and date of death

Variables		N	%
Sex	Men	279,125	54.2
	Women	235,741	45.8
Age	40-44	129,979	25.2
	45-49	107,002	20.8
	50-54	80,080	15.6
	55-59	64,952	12.6
	60-64	59,328	11.5
	65-69	41,828	8.1
	70-74	21,615	4.2
	75-79	10,082	2.0
No. screened	2002-2003	514,866	100
	2004-2005	334,966	65.1
	2006-2007	352,158	68.4
	2008-2009	361,043	70.1
	2010-2011	364,757	70.9
	2012-2013	345,693	67.1

Risk factors in 2002-2003 (baseline)		Men / Women	Men % / Women %
Cigarette smoking	Non-smoker	112,577/ 218,147	42.3/ 96.2
	Ex-smoker	41,519/ 2,170	15.6/ 1.0
	Current smoker	112,143/ 6,476	42.1/ 2.9
Smoking duration	<10 years	18,724/ 3,108	12.2/ 36.0
	10-29 years	93,620/ 3,646	60.9/ 42.2
	≥30 years	41,318/ 1,892	26.9/ 21.9
Alcohol drinking	Rarely	96,441/ 189,721	35.1/ 82.5
	2-3 per month	52,995/ 24,104	19.3/ 10.5
	1+ per week	125,688/ 16,134	45.7/ 7.0
Exercise	None	134,524/ 153,342	49.7/ 67.0
	1-2 per week	80,104/ 37,738	29.6/ 16.5
	3+ per week	55,916/ 37,669	20.7/ 16.5

Requirements for use: IRB approved Study Proposal should be reviewed by the committee.

Data access: through the remote Data Analysis System (currently accessible only in Korea)

Costs: For academic research, 175,000KW per month or 2,100,000KW (≈2,000 USD) per year

More information: https://nhiss.nhis.or.kr/ or Cohort profile: the National Health Insurance Service-National Health Screening Cohort (NHIS-HEALS) in Korea. BMJ Open. 2017 Sep 24;7(9):e016640. doi: 10.1136/bmjopen-2017-016640.

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The Moli-sani study: a whole Italian region turns into a scientific laboratory

Department of Epidemiology and Prevention, IRCCS INM NEUROMED, Pozzilli (IS), Italy
Contact: Marialaura Bonaccio, PhD at *marialaura.bonaccio@moli-sani.org*

THE IDENTIKIT OF THE MOLI-SANI STUDY

- A prospective cohort study
- 24,325 citizens of Molise
- Aged ≥35 years (no upper age limit)
- Enrollment: 2005-2010
- 70% participant rate
- Median Follow-up. 8 years, updated every 5 years
- Major ends points: CVD, neurodegenerative disease and cancer

THE QUESTIONNAIRES

- Face to face interviews
- Personal and family history of disease
- Health-related behaviors
- Dietary habits
- Quality of life
- Depression and resilience
- Socioeconomic status

THE VISIT

- Spirometry
- Digital electrocardiogram
- Height and weight (BMI)
- Body fat distribution
- Blood pressure

THE BIOBANK (MOLI-BANK)

- A high-technology structure
- Biological samples stored in liquid nitrogen at -196° C
- Protected with the most sophisticated technologies.
- Over 1,000.000 biological samples

A duplicate batch of 14 “pailletes” for each participant:

- 4 EDTA plasma (red colour)
- 3 citrated plasma (blue colour)
- 4 serum (yellow colour)
- 3 pellet for DNA extraction (green colour)

WHY A STUDY IN MOLISE?

- A small region (330,000 residents/ 4,400 Km^2)
- A privileged location within Italy and Europe
- Homogeneous region, both culturally and genetically
- Low immigration rate

BIOLOGICAL SAMPLES

- Blood, to analyze several biochemical parameters, but also to extract DNA as to study genetic characteristics
- Urine, to measure the levels of some substances

LABORATORY TESTS

- Cholesterol, HDL, TG; Glucose; C Reactive Protein; D-dimers; Blood cell count and many other biomarkers

THE ELSA-BRASIL COHORT STUDY

Brazilian Longitudinal Study of Adult Health

Background

- Brazil: 210 million inhabitants (mainly urban), racial admixture and marked social inequalities
- CVD: leading cause of death in Brazil (33%), mainly affecting the socially disadvantaged groups
- Rapid aging and nutritional transition – growing obesity and metabolic risk factors
- **Objective**: To investigate the distal and proximal determinants of cardiovascular disease and diabetes

Participants & Measurements

- 15,105 civil servants aged 35-74 from 5 Universities and 1 research institute located in 6 different large cities in Brazil (see map)
- Baseline examination: 2008-2010, Second visit: 2012-2014 (5% loss of follow up), Third Visit: 2017-2018 (ongoing)
- Interview: sociodemographics, parental history, occupation exposure, medical history, nutrition, sleep, physical activity, mental health & cognitive function
- Anthropometrics, blood pressure & exams: lab (storage at biobank), DNA, ECG, retinography, vascular function, image (echo, US, CT), strength
- Follow up for events (CVD, DM, CKD, cancer, venous thrombosis): annual telephone surveillance, at visits, events investigation & classification

Opportunities for collaboration: specific research proposals can be sent to individual ELSA investigators

- Racially admixed population (52% white, 28% mixed, 16% black): ancestry available
- High prevalence of CV risk factors: 63% excess weight, 61% high cholesterol, 36% high blood pressure and 20% impaired glucose tolerance
- GWAS: DNA extracted, projects under review for funding
- 8-year total mortality and 5-year CVD events available at end of 2018

Funding/previous collaborations

- Governmental funding: Brazilian Ministry of Health and Ministry of Science, Technology and Innovation
- Previous collaborations: MESA, The Framingham Heart Study, The Rotterdam Study

www.elsa.org.br
luisabrant@gmail.com

CIrculatory Risk in Communities Study: CIRCS

A historic, but ongoing, large Japanese cohort study established in 1963

Research groups Osaka Center for Cancer and Cardiovascular Disease Prevention, Osaka University (PI: Prof. Hiroyasu Iso), University of Tsukuba

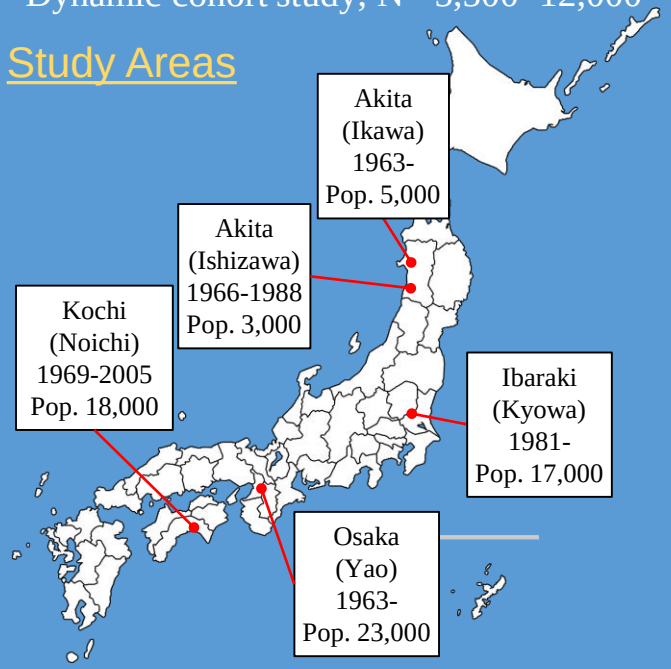
Aim

To improve population health in communities through integrated prevention strategy and CVD monitoring

Study design & Sample size

Dynamic cohort study; N= 5,500~12,000

Study Areas



Annual survey in health check-ups

Basic measurements

- Anthropometric measures (height, weight and waist circumference)
- Medical interview (medical history, alcohol intake, smoking status and etc.)
- Blood pressure levels
- Urine tests, blood tests (lipid, glucose, hepatic enzymes, creatinine and etc.)
- Echocardiogram, fundus photography

Occasional measurements

- Vascular function tests (e.g. FMD, AI)
- Dietary survey (e.g. 24-hr recall, FFQ)
- Physical function exams (e.g. grip power, gait speed)
- Sleep tests for obstructive sleep apnea (e.g. ODI, RDI)
- Additional blood tests using residual serum samples (e.g. CRP, fatty acids, NTproBNP)

Outcome survey

- Registry of incident stroke and coronary heart disease
- Date of deaths from the death certificate (cause of death was not available)
- Disabling dementia defined from the long-term care insurance data

Recent International Collaborations (examples)

The CKD Prognosis Consortium

J Am Soc Nephrol 2017; 28: 2167–2179

Global Cardiovascular and Renal Outcomes of Reduced GFR

Global Burden of Disease 2013 GFR Collaborators, CKD Prognosis Consortium, and Global Burden of Disease Genitourinary Expert Group

Due to the number of contributing authors, the authors and affiliations are listed at the end of this article.

The Emerging Risk Factors Collaboration

N Engl J Med 2012;367:1310-20.

C-Reactive Protein, Fibrinogen, and Cardiovascular Disease Prediction

The Emerging Risk Factors Collaboration*

Collaboration with the Minnesota field center of MESA

Eur Respir J 2010; 36: 379–384

Cross-cultural comparison of the sleep-disordered breathing prevalence among Americans and Japanese

K. Yamagishi*,#, T. Ohira*, H. Nakano*, S.J. Bielinski§, S. Sakurai/, H. Imano*, M. Kiyama**, A. Kitamura**, S. Sato##, M. Konishi*,**, E. Shahar*,*, A.R. Folsom#, H. Iso* and T. Tanigawa/

Contact

Isao Muraki, MD, PhD. Assistant Professor, Public Health, Graduate School of Medicine, Osaka University muraki@pbhel.med.osaka-u.ac.jp

- All community-dwelling adults in Ontario, Canada ages 20-105 eligible for province's universal health care program
- 2008 Cohort
  - 9,798,473 individuals
  - 96% primary prevention
  - 5 years + follow up
- Unique features
  - 19+ linked databases
  - Over 1.5 M immigrants from 200+ countries
  - Over 30 M lipids, HbA1C tests

- What data are available?
  - Health Outcomes
  - Socio-demographics
  - Cardiovascular risk factors
  - EMR Data
  - Medications
  - Physician characteristics
- How to get involved?
  - Contact CANHEART PI to explore collaboration
  - Funding opportunities – Close April 27th
- PI Contact Information
  - Jack V Tu, MD, PhD via canheart@ices.on.ca
  - See www.canheart.ca for more information

BRITISH REGIONAL HEART STUDY

About the cohort

Study design: Prospective cohort study

Original sample: representative cohort of 7735 men

Recruitment: recruited from General Practices in 1978–80 from 24 towns across Great Britain

Age at recruitment: 40–59 years

Measurements

- 13 postal questionnaires (diagnosed health conditions, personal circumstances, lifestyle, sensory impairments, memory etc.)
- 4 physical examinations at age 40-59, 60-79, 72-91 and 80-99 years (anthropometrics, physical function, dental, fasting bloods, ECG)
- Physical activity monitors worn at 5 time points
- Follow up for CVD events and new diagnoses were obtained from biennial primary care record reviews and annual update on mortality from the National Health Service Central Register

New areas of research

- Patterns of physical activity, predictors of these patterns and associations with CVD risk factors and mortality
- Diet quality and associations with sarcopenia and frailty
- Identifying individuals at risk of living in cold homes
- Risk factors for and markers of heart failure
- Poor oral health and health outcomes
- Vascular risk factors and frailty

Funding/collaborations

- This study is funded by the British Heart Foundation
- British Women's Heart Health Study; Genetic consortium – UCLEB; Emerging risk factors collaboration (ERFC); NCDRisC

Biomarkers for Cardiovascular Risk Assessment in Europe

IRCCS INM NEUROMED, Pozzilli (IS), Italy. Contact: Professor Licia Iacoviello at *licia.iacoviello@moli-sani.org*

http://www.biomarcare.eu

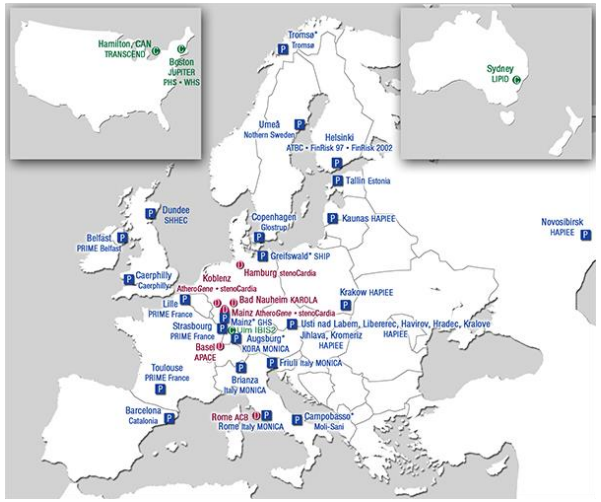


Table 1 Population-based cohorts of BiomarCaRE

Study	Country	Cohort size	Mean follow-up time (years)	Incident events	
				Acute coronary events	Stroke
PHASE 1					
ATBC placebo	Finland	7,287	14	1,416	823
FINRISK 97	Finland	8,444	14	412	303
Glostrup 82–92	Denmark	7,582	23¶	828	747
SHHEC	Scotland	16,000	21¶	1,882	869
PRIME Belfast	United Kingdom	2,745	16	272*	102*
SHIP-TREND	Germany	4,308*	0	**	**
GHS	Germany	15,000	5	**	**
KORA S3/S4	Germany	8,913	13¶	281	246
PRIME France	France	7,855	10	291	90
HAPIEE	Czech Republic	8,480	8	217*	209*
Brianza	Italy	4,932	21¶	222	133
Moli-Sani	Italy	24,325	4	163*	118*
PHASE 2					
Tromsø	Norway	31,847	20¶	2,221*	1,367*
Northern Sweden	Sweden	10,517	23¶	1,268*	1,043*
ATBC treatment	Finland	21,846	14	4,327	2,382
FINRISK 02/07	Finland	15,580	9¶	293	189
Glostrup 99/06	Denmark	10,984	11¶	221*	277*
CAPS	United Kingdom	1,911	20¶	444*	268*
Estonian	Estonia	52,000	5	200*	200*
HAPIEE	Lithuania, Poland, Russia	26,522	6¶	578	339
Friuli	Italy	1,786	4	12	8
Rome	Italy	4,489	10	74	81
Catalonia	Spain	5,505	10¶	76	81

AIM

Biomarkers are considered as tools to enhance cardiovascular risk estimation. Based on harmonized and standardized European population cohorts, we have established significant research collaboration, sharing expertise and infrastructure in the EU. We will apply highly innovative SME-driven technologies and perform large-scale biomarker determination to assess the predictive value of existing and emerging biomarkers.

The BiomarCaRE project aims to determine the additional value of multiple (new) biomarkers to improve risk estimation of cardiovascular disease (CVD)-related events in Europe. Shortly, the BiomarCaRE consortium will develop a "European biomarker panel" for CVD prediction including classical risk factors and established and novel biomarkers.

Project Description

BiomarCaRE is an EU FP7-funded collaborative research project that integrates clinical, epidemiological and biomarker research, as well as commercial enterprises throughout Europe, North America and Australia.

BiomarCaRE comprises 21 well-established prospective European population-based cohort studies, 4 cohorts of diseased subjects and 5 clinical trials, totaling **over 300,000 participants with follow-up**. The central BiomarCaRE laboratory is located at the University Heart Center Hamburg, Germany, where sample logistics and biomarker measurements but also data analyses have been performed.

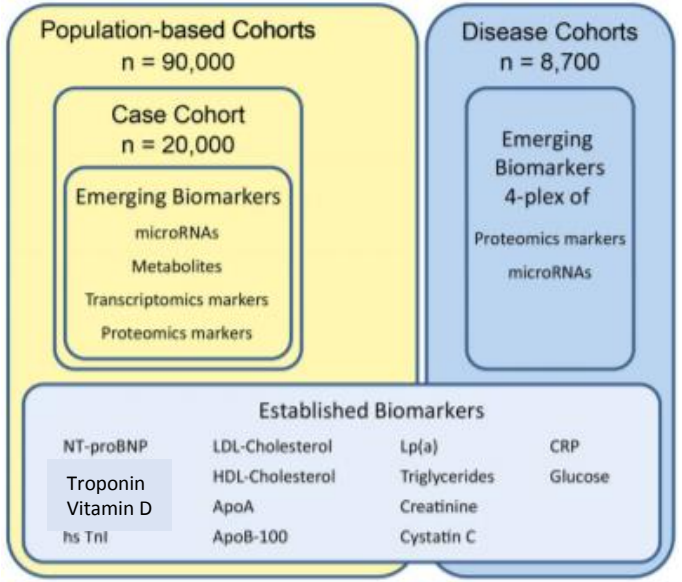
Novel, -omics-based biomarkers are identified by partners from the academic and private research enterprises (SME) and compared to well established biomarkers such as high-sensitivity troponin I, natriuretic peptides, high-sensitivity C-reactive protein, lipids, and further markers of cardiomyocyte micronecrosis, inflammation, and renal function. The SMEs introduce the technology and guide the development of the innovative assays needed for the measurement of these novel biomarkers.

Table 6 Number of cases and non-cases in the individual case cohort sets of the cohorts selected for the BiomarCaRE case-cohort study

Study	Country	Number of incident cases					Number of non-cases
		Coronary heart disease	Stroke	Heart failure	Atrial fibrillation	Type 2 diabetes	
Glostrup	Denmark	821	744	608	603	526	2,209
ATBC Placebo	Finland	1,414	822	–	–	–	2,068
FINRISK 97	Finland	354	260	442	307	525	1,384
PRIME France	France	286	90	–	–	–	414
KORA S3/S4	Germany	252	224	–	–	390	910
Brianza	Italy	218	119	–	–	–	369
PRIME Belfast	United Kingdom	185	53	–	–	–	282
SHHEC	Scotland	940	411	489	475	477	2,055
Total		4,470	2,723	1,539	1,385	1,918	9,691

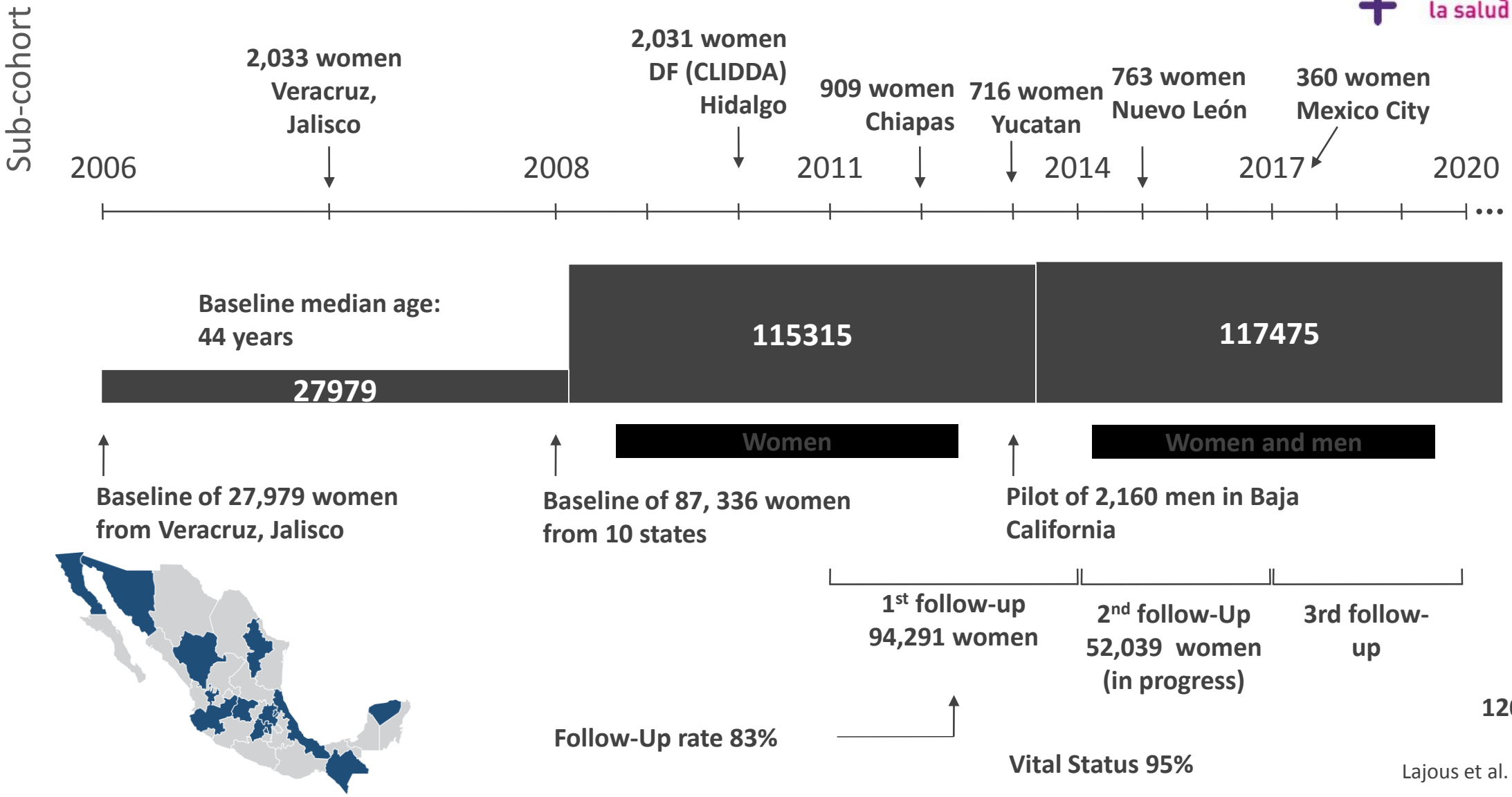
The BiomarCaRE project is unique in terms of its dimension, targeting of novel biomarkers based on -omics technology, and the evaluation of the impact of a multiple biomarker score in large prospective population cohorts across different European regions.

This large individual-based database provides a unique opportunity to investigate the performance of established and novel biomarkers for cardiovascular risk assessment across Europe.



Mexican Teachers' Cohort Study

ESMaestras
Investigación para mejorar la salud de la mujer



Lajous et al. Int J Epidemiol 2015

Exposure

- Early life factors (childhood SES, leg length, age at menarche, etc.)
- Body silhouettes and physical activity at different life stages
- Current diet (FFQ baseline and 2014-2017 cycle).
- Life stressor checklist, Perceived Stress Score (PSS)
- Reproductive history
- Smoking and second-hand smoke
- Migraine
- Restless leg syndrome and Pittsburgh Sleep Quality Index (PSQL)

Outcomes

- Incidence of diabetes, hypertension, and mortality (sufficient power of incident cases)
- Weight and waist circumference change
- Cross sectional analysis of subclinical cardiovascular disease markers (IMT, ABO , pulse wave velocity, and EKG).
- Cross sectional analysis of cardio-metabolic risk scales.

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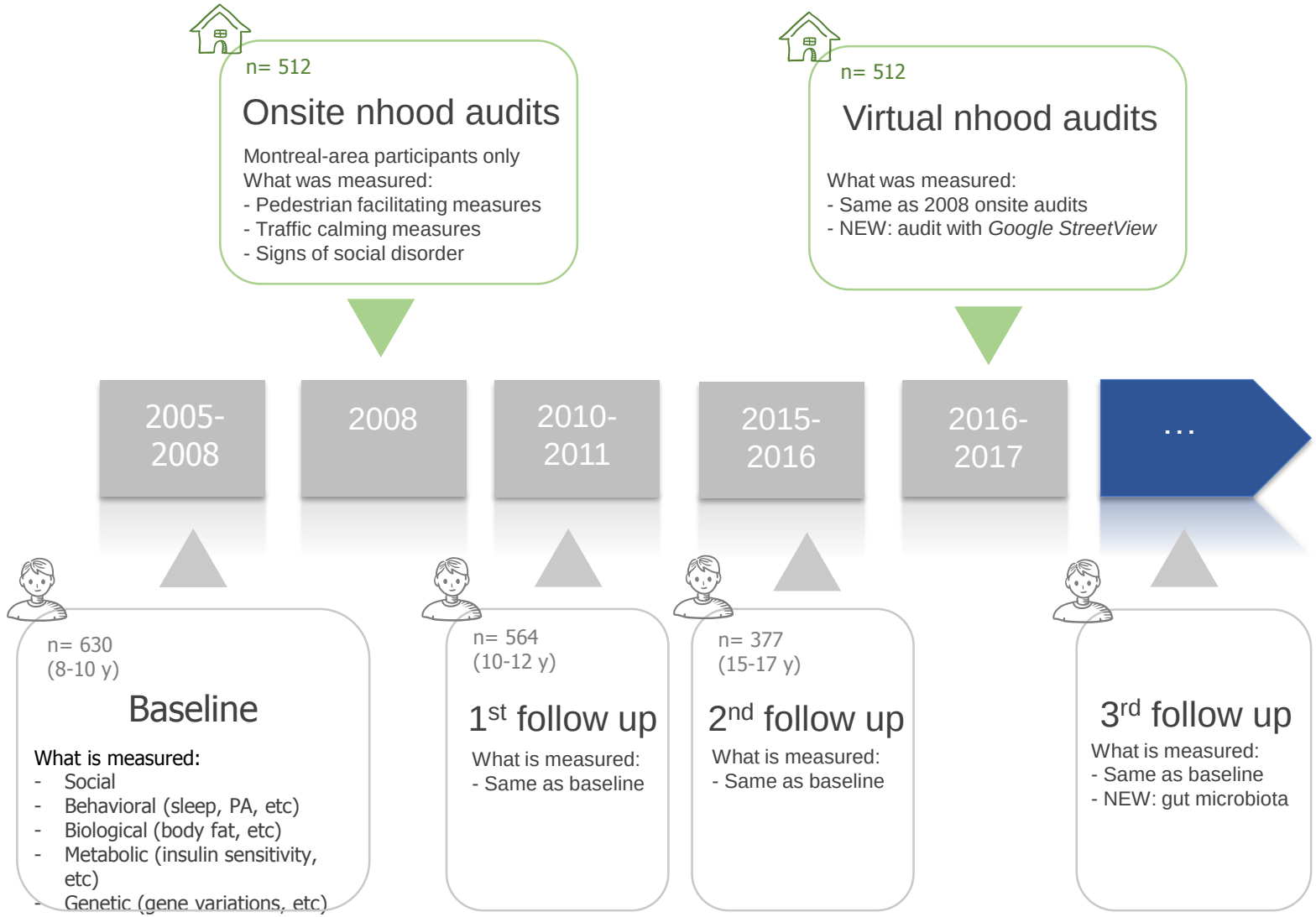
The i3C Outcomes Study

- The International Childhood Cardiovascular Cohort (i3C) is a consortium of 7 cohorts from the United States (Bogalusa, LA, Muscatine IA, Minneapolis MN and Cincinnati OH), Australia, and Finland, with a total of 40,000 participants
- Each cohort consists of individuals recruited during childhood (1970s or 1980s) and now age 30+ to 60
- The goal of this NIH funded study is to locate these individuals and obtain information on current cardiovascular (CV) health, diabetes and hypertension
- The major hypothesis is that childhood risk factors will predict adult CV disease
- The self-reported CV events are adjudicated from hospital medical records
- Of the 40,000 cohort members it is assumed that 30,000 will be found and

  20,000 will agree to participate

QUALITY

(QUebec Adipose and Lifestyle Investigation in Youth)



The PARIS PROSPECTIVE Study 3 (PPS3)

Bamba GAYE, PhD, MD candidate & Jean Phlippe EMPANA, MD, PhD
University Paris Descartes Sorbonne / Inserm U970, Paris, France

AHA-EPI Early Career International Studies Roundtable
March 2018, New Orleans, Louisiana

Study Design

The Paris Prospective Study III (PPS3) is registered in the World Health Organization international clinical trial registry platform (NCT00741728) in 25/08/2008. It complies with the Declaration of Helsinki. The study protocol was approved by the Ethics Committee of the Cochin Hospital (Paris, France) and all the volunteers were recruited after signing an informed consent form. The Paris Prospective Study III (PPS3) is an ongoing observational community-based study. Its design and main objectives have been published previously [1]. From June, 2008 to May 2012, 10,157 men and women aged 50-75 years were recruited at a large preventive medical center, the Centre d'Investigations Préventives et Cliniques (IPC), in Paris (France) The IPC is a preventive medical center that is subsidized by the French National Insurance System for Salaried Workers (Sécurité Sociale-CNAMTS). It offers a free medical examination every five years to all working and retired employees and their families living in the Paris area (France) covering 11 millions of inhabitants. Thus, subjects underwent such evaluation on their own initiative and are not referred by their physician. A self-administered questionnaire provides information related to university education, lifestyle behaviours (smoking, physical activity, food frequency) personal and family medical history, current health status and medication consumption.

Data

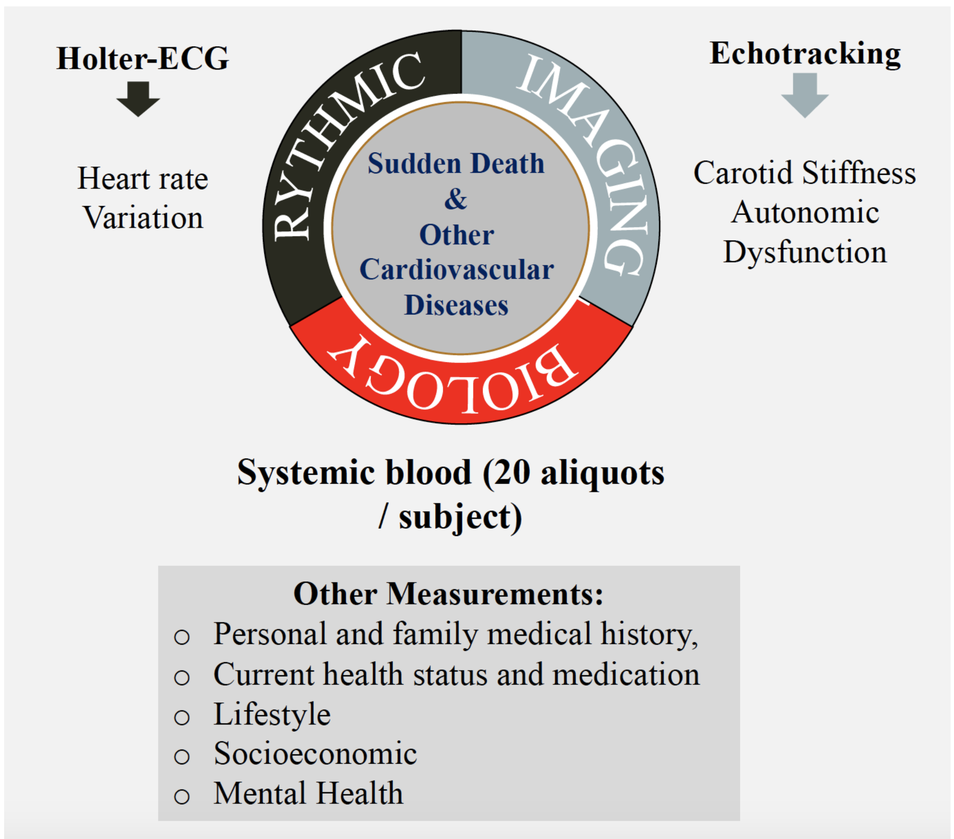
1-) Standard health check-up

- Complete clinical examination, coupled with standard biological tests.
- A self-administered questionnaire provides information related to professional activity, lifestyle (tobacco and alcohol consumption, physical activity, etc.), personal and family medical history, current health status and medication consumption.
- Two short questionnaires, respectively on food frequency and on physical activity (during work, leisure time activity and sports).

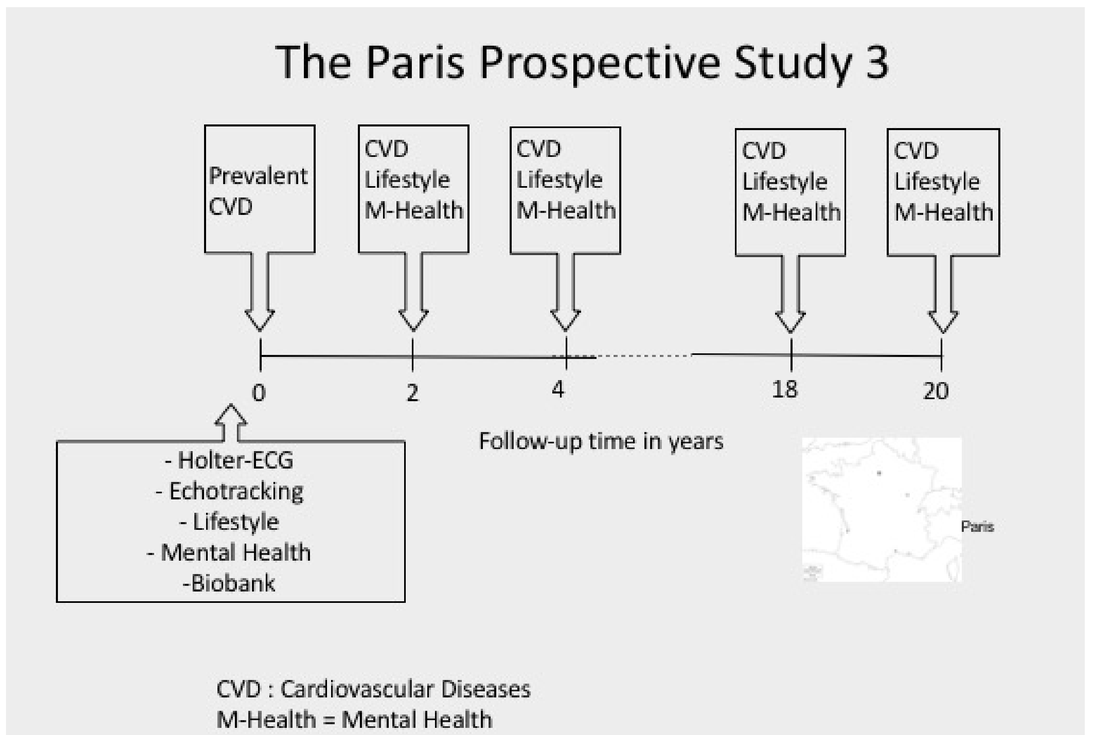
2-) HR recording, High Resolution Echotracking and Step Test

3-) Bio bank

In addition to the fasting blood sample collected for the biological tests that are part of the preventive health checkup, an additional 20 mL of are collected specifically for the study on citrate, EDTA, or dry tubes, and DNA cells extraction will be performed. For each study participant, the samples are aliquoted in 24 microtubes and frozen on site at −80°C.



Follow UP



Selected Publications

1. Empana J-P, Bean K, Guibout C, Thomas F, Bingham A, Pannier B, Boutouyrie P, Jouven X, PPS3 Study Group. Paris Prospective Study III: a study of novel heart rate parameters, baroreflex sensitivity and risk of sudden death. Eur J Epidemiol. 2011;26(11):887-892. doi:10.1007/s10654-011-9618-x.

2. Sharman JE, Boutouyrie P, Perier M-C, Thomas F, Guibout C, Khettab H, Pannier B, Laurent S, Jouven X, Empana J-P. Impaired baroreflex sensitivity, carotid stiffness, and exaggerated exercise blood pressure: a community-based analysis from the Paris Prospective Study III. Eur Heart J. 2018;39(7):599-606. doi:10.1093/eurheartj/ehx714.

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Additional information:

The PPS3 is open for scientific collaborations based on decisions made by the scientific committee.

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