Starting a Research Career in the Field of Diabetes

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Outline

• Hot topics in diabetes epidemiology, clinical, and translational research

• Training requirements for career success

• Personal insights
  – Golden career trajectory
  – Pearls of time management
NOVEL RISK FACTORS FOR INSULIN RESISTANCE, DIABETES, AND CVD

Traditional Risk Factors

Insulin Resistance

Type 2 Diabetes Mellitus

Atherosclerosis Cardiovascular Disease
Hot Topics in Diabetes
Epidemiology/Clinical Research

• Environmental determinants of diabetes
  – Heavy metals
  – Air pollution

• Health disparities in diabetes
  – Race/ethnic disparities
  – Sex disparities
Race/Ethnic Disparities in Diabetes Mellitus and Obesity
Diabetes Prevalence by Race/Ethnicity

7.6% Cuban, Central, South American
13.6% Mexican American
13.8% Puerto Rican American

Centers for Disease Control, National Diabetes Fact Sheet, 2011
<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese</td>
<td>20±5</td>
</tr>
<tr>
<td>Filipino</td>
<td>35±5</td>
</tr>
<tr>
<td>Asian Indian</td>
<td>40±5</td>
</tr>
<tr>
<td>Japanese</td>
<td>30±5</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>25±5</td>
</tr>
<tr>
<td>Korean</td>
<td>35±5</td>
</tr>
<tr>
<td>Other Asian NHOPI*</td>
<td>40±5</td>
</tr>
</tbody>
</table>

*Native Hawaiian/Other Pacific Islander

Sex Disparities in Diabetic Complications

• Microvascular complications rates similar in men and women

• Disparities in macrovascular complications
  – Diabetes increases risk of CHD and CHD mortality in women more than men
  – Peripheral arterial disease and diabetes-related lower limb amputations higher in men
Hot Topics in Diabetes Epidemiology/Clinical Research

- Social determinants of diabetes and obesity
Conceptual Framework for Health and Healthcare Disparities: Social Epidemiology

Intermediate Factors

- **Physical context**—neighborhood environment

- **Social context**—neighborhood cohesion, neighborhood socioeconomic status, social network, social capital, racial/ethnic integration
Hot Topics in Diabetes
Epidemiology/Clinical Research

• Social determinants of diabetes and obesity

• Diabetes in the elderly
  – Mechanisms of diabetes as a risk factor for cognitive decline, Alzheimer’s Disease, and vascular dementia
  – Mechanisms of functional disability in elderly with diabetes
Hot Topics in Diabetes
Epidemiology/Clinical Research

• Incorporation of mechanistic biomarkers into epidemiological studies to understand mechanisms of associations
  – Depression and type 2 diabetes
  – Sleep quality, sleep apnea, and type 2 diabetes
  – Understanding mechanisms allows design of novel preventive interventions
Research Training

Quantitative and Clinical Skills
PhDs without Clinical Background

• Formal training in epidemiology and biostatistics—PhD

• Clinically-oriented public health coursework
  – Diabetes/obesity epidemiology
  – Cardiovascular disease epidemiology
  – Infectious disease epidemiology

• Exposure to clinical diabetes
  – Clinical shadowing/observership
PhDs without Clinical Background

• Post-doctoral fellowship focused on diabetes or cardiovascular disease epidemiology
  – T32, individual NRSA (F32)
  – K08 or foundation career development award for junior faculty (ADA, AHA, Robert Wood Johnson Foundation)
  – Complimentary training/clinical exposure through affiliation with School of Medicine
MDs with Clinical Background

- Clinical background—general internal medicine, endocrinology, or cardiology
- Formal training in epidemiology and biostatistics
  - MPH, MSc, MHS, PhD
- Incorporate into clinical fellowship or junior faculty training
  - T32, individual NRSA (F32)
  - K23 or foundation career development award for junior faculty (ADA, AHA, Robert Wood Johnson Foundation)
Specific statistical skills for social epidemiology

- Multi-level/heirarchical/mixed effects models
- Statistical models of parameters that vary at more than one level
- Used for research designs where data for participants is organized at more than one level (nested data)
  - Individual level data nested within a contextual unit (e.g. acculturation with the setting of a given neighborhood environment)
  - Allows for repeated measures of individual level data
# Assessment of Socioeconomic Status

## Individual measures
- Education
- Income (in categories)
- Wealth measures (each receive a point)
  - Owning ≥1 car
  - Owning a home or paying mortgage on a home
  - Owning land or an investment (stocks, bonds, mutual funds, retirement investments)

## Neighborhood measures
- Derived from census tract
  - Median household income
  - Median value of owner occupied house
  - % households receiving interest, dividend, or net rental income
  - % adults ≥25 with high school degree
  - % adults ≥25 with college degree
  - % individuals ≥16 in professional, managerial, or executive occupations

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## Neighborhood Covariates

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>Pooled information of individuals living within a neighborhood designated by the use of GIS census tract</td>
</tr>
<tr>
<td>Education</td>
<td>Pooled information of individuals living within a neighborhood designated by the use of GIS census tract</td>
</tr>
</tbody>
</table>
| Physical Environment | **Walking Environment***:  
1. Is it pleasant to walk in my neighborhood  
2. The trees in my neighborhood provide enough shade  
3. In my neighborhood it is easy to walk places  
4. I often see other people walking in my neighborhood  
5. I often see other people exercise in my neighborhood  

**Availability of Healthy Foods***:  
1. A large selection of fresh fruits and vegetables is available in my neighborhood  
2. A large selection of low fat products is available in my neighborhood |

* Based on a Likert Scale of 1=strongly agree, 2=agree, 3=neutral (neither agree nor disagree), 4=disagree, 5=strongly disagree
### Neighborhood Covariates

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<th>Construct</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Environment</strong></td>
<td><strong>Aesthetic Quality</strong>*:</td>
</tr>
<tr>
<td></td>
<td>1. There is a lot of trash and litter on the street in my neighborhood[^]</td>
</tr>
<tr>
<td></td>
<td>2. There is a lot of noise in my neighborhood[^]</td>
</tr>
<tr>
<td></td>
<td>3. My neighborhood is attractive</td>
</tr>
<tr>
<td></td>
<td><strong>Safety</strong>*:</td>
</tr>
<tr>
<td></td>
<td>1. I feel safe walking in my neighborhood day or night</td>
</tr>
<tr>
<td></td>
<td>2. Violence is a problem in my neighborhood[^]</td>
</tr>
<tr>
<td></td>
<td><strong>Social Cohesion</strong>*:</td>
</tr>
<tr>
<td></td>
<td>1. People around here are willing to help their neighbors</td>
</tr>
<tr>
<td></td>
<td>2. People in my neighborhood generally get along with each other</td>
</tr>
<tr>
<td></td>
<td>3. People in my neighborhood can be trusted</td>
</tr>
<tr>
<td></td>
<td>4. People in my neighborhood share the same values</td>
</tr>
</tbody>
</table>

* Based on a Likert Scale of 1=strongly agree, 2=agree, 3=neutral (neither agree nor disagree), 4=disagree, 5=strongly disagree

[^]: These items are reverse coded.
Birth of a Research Career

San Antonio, TX
American Diabetes Association Meeting 2000
DEPRESSION

- Psychosocial: burden of illness, social support

- Behavioral: smoking, diet, physical activity, treatment adherence

- Neurohormonal: ↑cortisol, ↑catecholamines, ↑inflammatory markers

- Treatment: Serotonin reuptake inhibitors, Tricyclics

OBESITY

INSULIN RESISTANCE

TYPE 2 DIABETES
Training

1994-1997
- Internal Medicine

1997-2000
- Endocrine Fellowship
  MHS Clinical Epi (1998-2000)

2000-2004
- Refining Diabetes Epi Skills

2005-2010
- Psychiatry training
  Neuroendocrine training

Funding

1997-2000
- NHLBI CVD Epi T32

2002-2005
- RWJ Harold Amos Medical Faculty Dev. Award/NIDDK Diversity Supplement

2002-2005
- NIDDK K23
The Golden Pearls of Time Management
Managing your schedule

• Make a calendar of all of your standing meetings, conferences and clinical commitments

• Block out and schedule time designated for:
  – Research: papers, grants, experiments, clinical studies, data analysis, etc.
  – Clinic follow-up: editing notes, returning phone calls, prescriptions, checking labs
  – Teaching: lecture preparation, test/paper grading
  – Administrative and committee work
  – Meetings
Managing your schedule (con’d)

• Figure out what time of day that you function at your best—protect this time to be devoted to your research

• Figure out what time of day that you start to wind down mentally—use this time for meetings

• Consider working from home one day/week if you find your work environment frequently disrupted—this time is useful for tasks requiring long periods of concentration such as writing, reviewing articles, or analyzing data
Managing your teaching and clinic schedules

- Designate office hours for your students
- Designate a specified call-back time for your patients
- Give your patients a clinic summary document stating:
  - Call-back time
  - When they should expect lab results (consider doing this via a form letter)
  - Who to call for things that do not require a physician—scheduling, billing, etc.
Keeping up with the literature

- Try to attend a regular journal club in your area of research interest
- Designate a couple of hours/week to review abstracts in the journals that you receive regularly
Managing your personal life

- Maintain your hobbies and friends outside of work
- Get at least 7-8 hours of sleep/night
- Exercise regularly to reduce stress/tension
- Determine whether working at home in the evening or at night or on the weekends makes you more or less effective
- Look for reliable daycare that works with your schedule—consider an evening babysitter a couple of days/week
- Get assistance with some household chores—cleaning, laundry, yard work, groceries
Maintain Balance!