DECLARATION OF CONFLICT OF INTEREST

• None
Stand up, Sit less, Move more

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What did we do?

US National Health and Nutrition Examination Survey (NHANES)

- Large, population-representative, multi-ethnic, continuous cross-sectional study conducted across the United States
  - Surveys, laboratory and physical examination data

- Accelerometer data available for 2003/4 & 2005/6 surveys
  - Objective estimate of intensity of bodily movement
  - Average daily sedentary time (<100 counts per minute: cpm)
  - Breaks in sedentary time (no. of times exceeded 100cpm)

Data source

Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), for the National Health and Nutrition Examination Survey Data
Who Participated?

US National Health and Nutrition Examination survey (NHANES)

• Able bodied adults
• > 20 years
• not pregnant
• not taking insulin
• with available data

• 4757 participants
  – 2479 male, 2278 female
  – 2,662 non-Hispanic whites,
  – 958 Mexican Americans,
  – 835 Non-Hispanic blacks

• Mean age 46.5 years (95% CI 45.5 - 47.5)
What did we find? (differences between Q1 & Q4)

<table>
<thead>
<tr>
<th>Metabolic Biomarker</th>
<th>Total sedentary time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waist Circumference, cm</td>
<td>↑ 1.4 cm</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>↓ 1.79 kg/m²</td>
</tr>
<tr>
<td>Systolic BP, mmHg</td>
<td></td>
</tr>
<tr>
<td>Diastolic BP, mmHg</td>
<td></td>
</tr>
<tr>
<td>HDL-Cholesterol, mmol/L</td>
<td>↓ 0.06 mmol/L</td>
</tr>
<tr>
<td>C-Reactive Protein, mg/dL</td>
<td>↑ 0.02 mg/dL</td>
</tr>
<tr>
<td>Fasting Triglycerides, mmol/L</td>
<td>↑ 0.26 mmol/L</td>
</tr>
<tr>
<td>Fasting Plasma Glucose, mmol/L</td>
<td></td>
</tr>
<tr>
<td>Fasting Plasma Insulin, pmol/L</td>
<td>↑ 11.6 pmol/L</td>
</tr>
<tr>
<td>HOMA-%B</td>
<td>↑ 11.6 %</td>
</tr>
<tr>
<td>HOMA-%S</td>
<td>↓ 36%</td>
</tr>
<tr>
<td>2-hr plasma glucose, mmol/L</td>
<td></td>
</tr>
</tbody>
</table>

Detrimental association p<0.05

Adjusted for age, sex, race/ethnicity & exercise time, plus socio-demographics, behaviours, & medical history if p<0.2. Breaks in sedentary time additionally adjusted for total sedentary time.
What else did we find?
Examination of age, sex & race/ethnicity subgroups

• No meaningful differences by age
• Minimal differences by sex
  • Sig. associations in one sex but not the other for HDL-C only: sedentary time in males; breaks in females
• Several differences by race/ethnicity for total sedentary time
  • Strongest associations observed for non-Hispanic Whites
  • Minimal or beneficial (waist circumference) associations for non-Hispanic Blacks
“Study finds more breaks from sitting are good for waistlines and hearts”

Press release 12th January, 2011

- Extensive media interest
- 400+ print, radio, magazine, TV, online articles (ongoing)
- Ranked in top 5 Bloomberg articles
What was the media interested in?

• Primarily interested in the breaks story
  – Even small changes (as little as 1 minute) could potentially make a difference
Where are we taking this research?
1) Identifying relationships of sitting time with health outcomes

2) Measuring and characterising sitting time in populations

3) Identifying the determinants of sitting time

4) Developing and testing interventions to influence sitting time

5) Discovering biological mechanisms

6) Informing public health guidelines and policy
Identifying relationships of sitting time with health outcomes
AusDiab: TV time and all-cause mortality (hazard ratios)

Adjusted for age, sex, smoking, education (≥12 years), total energy intake, diet quality index, leisure-time exercise, waist circumference, hypertension (blood pressure ≥140/90 mmHg or anti-hypertensive medication use), total plasma cholesterol, HDL-cholesterol (mmol/L), serum-triglycerides (mmol/L, log), lipid-lowering medication use, previously reported cardiovascular disease (angina, myocardial infarction or stroke), glucose tolerance status).

Dunstan, *Circulation*, 2010
Developing and testing interventions to influence sitting time

Laboratory-based intervention studies
- Simulated workplace
- Dose-response
- Mechanistic

Field (real world) intervention studies
“Understanding the acute and cumulative metabolic effects of prolonged sitting in adults”

‘The IDLE Breaks study’
Results: Glucose

Dunstan et al. (unpublished findings)
Results: Insulin

Dunstan et al. (unpublished findings)
Discovering biological mechanisms
Skeletal Muscle Gene Expression Profile
IDLE breaks study

5 genes
• Inflammatory networks

43 genes
• Cellular organisation/development
• Skeletal/muscle system function
• Metabolism
Informing public health guidelines & policy

National Heart Foundation of Australia Consumer Information Sheet
- “Sitting Less for Adults”

American College of Sports Medicine Position Stand on Physical Activity
- specific reference to breaking up and reducing sedentary time