Blood Based Biomarkers in the Health and Retirement Study

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The Health and Retirement Study (HRS) has collected samples for blood-based biomarkers since 2006.

At each wave blood is collected from half the sample. So a combination of two waves is needed for the whole sample.

Blood is collected from sample members at 4 year intervals

Wave 1

| 2006 | 2008 |

Wave 2

| 2010 | 2012 |
Dried Blood Spots

• Total Cholesterol
• HDL Cholesterol
• C-Reactive Protein
• HbA1c
• Cystatin C
## Multiple Laboratories Across Waves and Within Waves

<table>
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<tr>
<th></th>
<th>HbA1c</th>
<th>Total Cholesterol</th>
<th>HDL Cholesterol</th>
<th>CRP</th>
<th>Cystatin C</th>
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<td><strong>Biosafe</strong></td>
<td>2006</td>
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<td><strong>FlexSite</strong></td>
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<td><strong>University of Vermont</strong></td>
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<td><strong>The University of Washington</strong></td>
<td>2012</td>
<td>½ 2008</td>
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<td>2014</td>
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<td><strong>Heritage</strong></td>
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To compare across waves HRS has developed HRS NHANES Equivalent measures.

The HRS NHANES equivalent values make the assay levels for the HRS data based on DBS similar to the level in NHANES where values are based on conventional venous blood assays. This preserves the variability in the HRS sample and allows the results to be comparable to those based on venous blood assays and to use conventional cutoff values.

- Our approach is to calculate the values of the assays corresponding to (weighted) 100 percentiles in HRS and in NHANES.

- We then regress the HRS value on the NHANES value to create an equation that can be used to convert individual HRS values into NHANES Equivalent values.

- Each HRS wave and lab is done separately

- 2010-2012 are equivalent to NHANES (2009-2010, 2011-2012)
Total Cholesterol – NHANES and HRS NHANES Equiv
HDL Cholesterol – NHANES and HRS NHANES Equiv

NHANES 2005-2008

NHANES 2009-2012

HRS 2006/08 NHANES Equiv

HRS 2010/12 NHANES Equiv
HbA1c – NHANES and NHANES Equiv.
Logged CRP – NHANES and NHANES Equi.

NHANES 2005-2008
NHANES 2009-2010
HRS 2006/08 NHANES Equi
HRS 2010/12 NHANES Equiv
Cystatin C—NHANES and NHANES Equiv

- NHANES 1992-2002
- HRS 2006/08 NHANES Equiv
- HRS 2010/12 NHANES Equiv
Average change over time in HRS reflects change in NHANES

Individual HRS values across waves are comparable
Initial insights into what we will find when data are out -

Rate of onset of high risk levels among those who are not at risk in the first wave is not strongly positively related to age for most of these markers (cystatin C is the exception).

Rates of onset by gender are quite similar for all but high cholesterol.

Gender onset rates are more similar than cross-sectional prevalence for many markers.
High Total Cholesterol Prevalence (2006/08) and Onset (2006/08 - 2010/12)
Low HDL Prevalence (2006/08) and Onset (2006/08 -2010/12)
High HbA1c Prevalence (2006/08) and Onset (2006/08 - 2010/12)

**Prevalence**

- **50-59**
  - Males: ~10
  - Females: ~12

- **60-69**
  - Males: ~15
  - Females: ~18

- **70-79**
  - Males: ~18
  - Females: ~20

- **80+**
  - Males: ~15
  - Females: ~12

**Onset**

- **50-59**
  - Males: ~5
  - Females: ~7

- **60-69**
  - Males: ~10
  - Females: ~13

- **70-79**
  - Males: ~15
  - Females: ~18

- **80+**
  - Males: ~10
  - Females: ~12
High CRP Prevalence (2006/08) and Onset (2006/08 - 2010/12)
High Cystatin C Prevalence (2006/08) and Onset (2006/08 - 2010/12)
Sum –
Use NHANES equivalent values.
Even combining the original values across the sample at one wave is not always possible.

NHANES equivalent allows comparisons across studies with similar measurement and use of conventional risk levels.

The HRS future ???
   New assays???
   New challenges with new methods???

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