1. Background/purpose of LLS
2. Eligibility criteria
3. Enrolled population
4. Data/blood collection
5. Related ancillary studies
6. Where to find the data
Establish a new baseline from which studies on aging and health/disease could be conducted and replenish the WHI biospecimen resource for a subset of the WHI cohort.
Different times, different measures

- 2012/2013, during Extension II (14-19 years post baseline)
- First time new blood specimens and physical measures were collected since the main WHI study ended in 2005
- The WHI clinical centers closed at the end of Extension I, so blood and data collection could not occur in a clinical setting
- WHI partnered with Examination Management Services, Inc. (EMSI), a home blood and data collection service, to do the one-time LLS exam at the participants’ homes
Long Life Study was designed to maximize the potential scientific opportunities in a cost-efficient manner, taking advantage of existing resources.
LLS Eligibility Criteria

- Medical Records Cohort (MRC): all Hormone Trial, African Americans, and Hispanics in WHI Extension II
- CVD biomarker data from WHI baseline
- GWAS data
- at least 63 years old by 1/1/12
- Exclusion criteria:
  - unable to provide informed consent (e.g., dementia)
  - residing in an institution (e.g., skilled nursing facility)
- Targeted enrollment was 8,000
- Three phases of eligibility due to lower than expected consent rate – 14,081 eligible

<table>
<thead>
<tr>
<th>Phase</th>
<th>Inclusion criteria</th>
<th>Eligible</th>
<th>Date selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>MRC, GWAS, baseline CVD biomarkers, age 72+ years (on 1/1/12)</td>
<td>9,930</td>
<td>10/5/2011</td>
</tr>
<tr>
<td>Phase II</td>
<td>MRC, GWAS, baseline CVD biomarkers, age 63+ years (on 1/1/12)</td>
<td>2,651</td>
<td>5/3/2012</td>
</tr>
<tr>
<td>Phase III</td>
<td>MRC, oversampling of minorities (no age restriction), European American age 81+ years (on 8/1/12), GWAS and baseline CVD biomarker tests completed subsequent to consent mailing for all Phase III eligibles</td>
<td>1,500</td>
<td>8/2/2012</td>
</tr>
<tr>
<td>Total</td>
<td>Phase I, Phase II, and Phase III eligible</td>
<td>14,081</td>
<td></td>
</tr>
</tbody>
</table>
LLS Final Enrolled Population

- 9,246 consenters
  - 7,875 completed exams
  - 7,481 successful blood draws
- From the 2015 WHI annual progress report:

<table>
<thead>
<tr>
<th>Consent Status for Long Life Study Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data as of: September 20, 2013</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Number eligible</td>
</tr>
<tr>
<td>Phase 1: Age 72-79</td>
</tr>
<tr>
<td>Phase 2: Age 63-72</td>
</tr>
<tr>
<td>Phase 3: Age 64-98</td>
</tr>
<tr>
<td>Consented</td>
</tr>
<tr>
<td>Completed visit</td>
</tr>
<tr>
<td>Age at visit</td>
</tr>
<tr>
<td>63-69</td>
</tr>
<tr>
<td>70-79</td>
</tr>
<tr>
<td>80-89</td>
</tr>
<tr>
<td>≥90</td>
</tr>
<tr>
<td>Race/ethnicity</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Black</td>
</tr>
<tr>
<td>Hispanic</td>
</tr>
<tr>
<td>Blood draw</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>14081</td>
</tr>
<tr>
<td>9930 (70.5%)</td>
</tr>
<tr>
<td>2651 (18.8%)</td>
</tr>
<tr>
<td>1500 (10.7%)</td>
</tr>
<tr>
<td>9246 (65.7%)</td>
</tr>
<tr>
<td>7875 (85.2%)</td>
</tr>
<tr>
<td>724 (9.2%)</td>
</tr>
<tr>
<td>3050 (38.7%)</td>
</tr>
<tr>
<td>3689 (46.8%)</td>
</tr>
<tr>
<td>412 (5.2%)</td>
</tr>
<tr>
<td>3910 (49.7%)</td>
</tr>
<tr>
<td>2651 (33.7%)</td>
</tr>
<tr>
<td>1314 (16.7%)</td>
</tr>
<tr>
<td>7481 (95.0%)</td>
</tr>
</tbody>
</table>

1 Percentage of eligible
2 Percentage of consented
3 Percentage of completed visit
At the exam: physical measurements
Form 301 (f301_whills_inv.dat)

- Pulse, BP
- Height and waist circumference (inches)
- Weight (lbs)
- Grip strength (right and left)
- Short Physical Performance Battery (SPPB) components:
  - 4 balance tests
  - Timed Walk (3 or 4 meters)
  - Chair stand
Calculated variables: physical measurements

Form 301 (f301_whills_inv.dat)

- Calculated variables:
  - Body Mass Index (BMI)
  - Short Physical Performance Battery (SPPB) scores*
    - Look Ahead – based on Health ABC
    - Established Populations for the Epidemiologic Studies of the Elderly (EPESE)

*See F301 supplemental documentation for a description of the scoring algorithms (www.whi.org/researchers/data/Pages/categories/measurements.aspx).

Medical and Physical Measurements

Form 301 Supplemental Documentation: Long Life Study Short Physical Performance Battery (SPPB) Scoring

Informational data items related to the AS 286 - Objective Physical Activity and Cardiovascular Health Study (OPACH) were collected on Form 301, but those data are not included in this release.

BMD summary: Bone Density measurements were collected on a subsample of 11,020 participants at three clinical sites (see the subsample definitions on the previous WHI Data on this site). See the 2005 progress report for a summary of bone mineral density analysis, including percent change from baseline; see page 2-6 for HT table, page 3-13 for DM, page 4-3 for CaD, and page 5-2 for OS. For the standardized procedures for performing the measurements, see Vol. 6 – DXA Quality Assurance of the WHI (1993–2006) manuals under the Documentation tab.

Data Dictionaries
Fasting* blood draw

Vials collected at the exam:
1. EDTA PST**
2. 2 ml EDTA (for CBC)
3. 10 ml EDTA
4. SST**
5. PAXgene®

Stored in the repository:
1. EDTA plasma (separator)
2. DNA from buffy coat
3. Red blood cells
4. EDTA plasma
5. Serum (separator)
6. RNA

*Participants were asked to fast for 12 hours. Actual fasting hours were recorded on Form 301.
**PST = plasma separation tube, SST = serum separation tube

Unique to LLS samples: 100% DNA and RNA already extracted; blood has already been sub-aliquoted (250 ul subs).
We have RNA! Please use it!

- RNA is a new resource for WHI
  - Only available for LLS participants
- RNA was extracted from PAXgene® tubes in 2012/2013 and has been stored at -80°C
- Performed well in a pilot study in 2015 (AS518 - RNA sequencing)
  - AS518 RNA integrity analysis (RIN) indicated high quality
LLS blood: data available in spec_results_ctos_inv under W64

- **Complete blood counts (CBC) with differential (fresh whole blood at Seattle Cancer Care Alliance clinical lab):** red blood cell (RBC), white blood cell (WBC), platelets, hemoglobin (Hgb), hematocrit (Hct), auto-differential, RBC parameters, and platelet parameters

- **CVD Biomarkers (serum at the University of Minnesota ADRL lab):** glucose, insulin, creatinine, CRP, and lipids (HDL, LDL, triglyceride, cholesterol)
Outcomes since LLS

- LLS blood collection may be closer to some outcomes than WHI baseline
- Verified outcomes after LLS blood draw (as of 9/30/15)
  - Total cardiovascular disease: 268
  - Total cancer: 208
  - Hip fracture: 78
  - Total deaths: 422
- See the 2015 WHI annual progress report Long Life Study (section 13), tables 13.6 and 13.7 for counts further broken down by outcome, age at visit, and race/ethnicity
Related Ancillary Studies

- **AS286 (OPACH):** Objective Physical Activity and Cardiovascular Health in Women
  - PI: Andrea LaCroix
  - n=~7,000
  - Data collection: falls calendar, accelerometry, physical activity questionnaire (Form 321)

- **AS340 (WHI-FI):** Evidence for Establishing Optimum Protein Intake in Older Adults
  - PI: Jeannette Beasley
  - n=6,095
  - Data collection: food frequency questionnaire (FFQ)

- **AS337:** B&T lymphocyte sub populations
  - PI: Kerstin Edlefsen/Alex Reiner
  - n=600
  - Data collection: T and B lymphocyte subsets by flow cytometry

**Note:** This data has not been included in the investigators’ data release yet. Please contact the PIs for access to this ancillary study data.
Review: LLS basics

- Subset of WHI participants with rich data (n=7,875 MRC)
- Longitudinal measures 14-19 years apart (Baseline / LLS)
  - Physical measures
  - CVD biomarkers
  - Complete Blood Count (CBC)
  - Blood and DNA
- Data collected at participant homes rather than clinical centers
- Outcomes after LLS blood draw have occurred
Review: where to find the data

- **Physical measurements:**
  - Baseline: `f80&90_ctos_inv.dat`
  - LLS: `f301_whills_inv.dat`
  \[ \text{Note difference in units} \]

- **CBC:**
  - Baseline: `cbc_ctos_inv.dat`
  - LLS: `spec_results_ctos_inv` (under W64, includes differential)

- **CVD biomarkers:**
  - Baseline: `spec_results_ctos_inv` (under W54, W58, or W66)
  - LLS: `spec_results_ctos_inv` (under W64)

- **GWAS data:**
  - Phase I and II eligibles: included in dbGaP WHI Harmonized and Imputed GWAS data (`phs000746`)
  - Phase III eligibles (W66): dbGaP submission in process (will NOT be harmonized or imputed)

- **Ancillary study data** (AS286, AS340, AS337): Ask PI
Questions?

Megan Skinner Herndon
mskinner@whi.org
helpdesk@whi.org

https://www.whi.org/studies/SitePages/Long%20Life%20Study.aspx