WHI Cancer Survivor Cohort (CSC)

Multiple PIs: Garnet Anderson, Bette Caan, and Electra Paskett

Funded by the NCI U01 CA173642
Life and Longevity After Cancer (LILAC)  
First Funding Period

Specific Goals

- Collect treatment and outcomes data for 8 cancers
- Collect tumor tissue for solid tumors diagnosed in 2002 or later
- Collect baseline and annual surveys for newly diagnosed and those alive
- Develop/refine/evaluate methods to use administrative data to get treatment and recurrence information.
## Total Cancer Cases. Number participating in the Survey and Number of Tissue Specimens

<table>
<thead>
<tr>
<th>Cancer Site</th>
<th>Confirmed Diagnosis</th>
<th>Total with Treatment and recurrence data</th>
<th>Tissue collection received</th>
<th>Total with baseline survivor questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasive Breast</td>
<td>10050</td>
<td>4822</td>
<td>2103</td>
<td>4586</td>
</tr>
<tr>
<td>Colorectal</td>
<td>2910</td>
<td>1253</td>
<td>647</td>
<td>866</td>
</tr>
<tr>
<td>Endometrial</td>
<td>1693</td>
<td>755</td>
<td>386</td>
<td>701</td>
</tr>
<tr>
<td>Leukemia</td>
<td>827</td>
<td>642</td>
<td></td>
<td>206</td>
</tr>
<tr>
<td>Lung</td>
<td>3063</td>
<td>1280</td>
<td>526</td>
<td>462</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>1484</td>
<td>1039</td>
<td></td>
<td>490</td>
</tr>
<tr>
<td>Melanoma</td>
<td>2185</td>
<td>757</td>
<td>451</td>
<td>963</td>
</tr>
<tr>
<td>Ovarian*</td>
<td>1229</td>
<td>589</td>
<td>238</td>
<td>235</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>23441</strong></td>
<td><strong>11726</strong></td>
<td><strong>4351</strong></td>
<td><strong>8754</strong></td>
</tr>
</tbody>
</table>

*Ovarian includes primary ovarian, fallopian tube, and peritoneal cancers*
NIH funded/submitted studies done with Lilac I - Mostly Molecular

- Molecular Pathological Epi of CRC / Peters/R01
- Early Detection of Ovarian CA through Epigenetic Factors / Genkinger/R01
- Novel bacterial oncoprotein AvrA: mechanistic and epidemiologic studies in CRC-submitted R01
- Functional Genomics in Diverse Breast Cancer Patients/submitted R01
- Relationships between guideline-concordant TX and survival following endometrial CA diagnosis/Felix/supp
- Obesity and mortality after BC diagnosis by race-ethnicity / Barrington/supp
Estimated cancer prevalence by age in the US population from 1975 (216 million) to 2040 (380 million)

<table>
<thead>
<tr>
<th>Aims</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enroll newly diagnosed survivors (N=2685)</td>
</tr>
<tr>
<td>2. Assess trajectories of aging &amp; accelerated aging. Map new and old</td>
</tr>
<tr>
<td>data to indices of pre-frailty and frailty, functional decline,</td>
</tr>
<tr>
<td>and comorbidities</td>
</tr>
<tr>
<td>3. Using an age-matched cancer-free control group examine effects</td>
</tr>
<tr>
<td>of a cancer diagnosis and its treatment on aging.</td>
</tr>
<tr>
<td>4. Obtain in a Long Life in-home visit for 2000 cancer survivors</td>
</tr>
<tr>
<td>measures of physical function and post-treatment blood samples</td>
</tr>
<tr>
<td>to assess potential biomarkers of accelerated aging.</td>
</tr>
</tbody>
</table>
### Projected New Cancer Cases through 2022

<table>
<thead>
<tr>
<th>Cancer site</th>
<th>Projected new cancer cases</th>
<th>Projected new cases to get Rx, recurrence and a survivor questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invasive breast</td>
<td>1567</td>
<td>1175</td>
</tr>
<tr>
<td>Colorectal</td>
<td>416</td>
<td>312</td>
</tr>
<tr>
<td>Endometrial</td>
<td>225</td>
<td>169</td>
</tr>
<tr>
<td>Leukemia</td>
<td>128</td>
<td>96</td>
</tr>
<tr>
<td>Lung</td>
<td>447</td>
<td>335</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>192</td>
<td>144</td>
</tr>
<tr>
<td>Melanoma</td>
<td>447</td>
<td>335</td>
</tr>
<tr>
<td>Ovarian</td>
<td>159</td>
<td>119</td>
</tr>
<tr>
<td>Total</td>
<td>3581</td>
<td>2685</td>
</tr>
</tbody>
</table>
More studies of vulnerable older adults and/or those age ≥ 75 are needed
1) study those with comorbidities, function losses, cognitive decline, and frailty
2) understand how cancer and its treatments interact with underlying vulnerabilities

Geriatric assessment measures needed in oncology research
1) Incorporate validated GA measures
2) Collect endpoints, such as maintenance of functional abilities and quality of life
3) Measure mental health and cognitive changes

Incorporate aging biomarkers in oncology research
1) Aging biomarkers to identify those at risk for cancer treatment side effects
2) Tumor samples to assess whether tumor biology changes with aging

Understanding Accelerated aging in Cancer Survivors

- No Cancer
- Cancer Survivor Phase Shift Hypothesis
- Cancer Survivor Accelerated Aging Hypothesis

- Functional Impairment becomes Disability
- Cancer Diagnosis and treatment

Time
### Approaches to measuring Frailty in Cancer

| The phenotype model<sup>a</sup> | Exhaustion  
|                                | Low physical activity  
|                                | Weakness  
|                                | Slow walking  
|                                | Unintentional weight loss  
| The frailty index of deficit accumulation<sup>b</sup> | Deficits of symptoms and signs  
|                                                               | Comorbidities  
|                                                               | Deficits of activities of daily living  
|                                                               | Deficits of social relations and social support  

<sup>a</sup>The phenotype model is based on five physical indicators  

<sup>b</sup>The frailty index of deficit accumulation is calculated from a variety of individual health deficits
Frailty Index

Rockwood’s approach from CSHA (Canadian Study on Health and Aging) is based on the concept that deficit accumulation – a combination of symptoms, disease, conditions, and disability – can predict frailty.

- Sum of >70 items used to construct FI
- Includes self rated health, function, cognition, and psychosocial risk factors

Develop a macro to develop this index for all LILAC women.

Rockwood K. A global clinical measure of fitness and frailty in elderly people. CMAJ 2005
Geriatric Assessment Domains and Measures Captured in WHI and LILAC

Demographics
- Education, Employment, Marital Status, Annual Income
  - All, % of pts

Polypharmacy/Medications
- Medications & Supplements
  - All, % of pts

Functional Status
- Activities of daily living
  - All, % of pts
- Falls
  - All
- Grip Strength
  - % of pts

Cognition
- Physical Activity and Exercise
  - % of pts
- Expanded MMSE (3MSE)
  - All, % of pts

Psychological State
- Thoughts, Feelings, Emotions
  - All, % of pts

Social Support
- Social Support, Care Giving, Social Strain
  - All, % of pts

Nutrition
- Weight & Weight Change
  - All, % of pts

Quality of Life
- Qol, Sleep, Incontinence, Sexual Activities
  - All, % of pts

WHI LAUNCHES, 1993

WHI initial recruitment (1993-1998)
- Baseline
  - All
- 1 Year
  - CT only
- 3 Year
  - All
- 6 Year
  - CT only
- 9 Year
  - CT only
- Closeout

WHI extension (2005-2010)
- 2005
- 2008
- 2010

WHI extension (2010-2020)
- 2012
- 2013
- 2015

MRC cohort, LLS, LILAC recruited

LILAC recruitment 2015

Measured annually from 2005 on

Falls are recorded every year
Geriatric Assessment Domains and Measures Captured in WHI and LILAC

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- Education, Employment, Marital Status, Annual Income

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- 2012
- 2013
- 2015
- 2018
- 2020

WHI extension (2010-2020)
- 2012 MRC cohort
- LLS
- LILAC
- LILAC recruitment

Polypharmacy/ Medications
- All, % of pts

Medications & Supplements
- All, % of pts

Activities of daily living
- All, % of pts

Muscle strength
- % of pts

Physical Activity and Exercise
- All, % of pts

Falls
- All, % of pts

4 Meter Timed Walk
- % of pts

Measures annually from 2005 on

Falls are recorded every year

1993 2008

Closeout

2005 2010

1998

1993-1998

2005-2010

2010-2020

Baseline

1 Year

3 Year

6 Year

9 Year

Closeout

2012 MRC cohort

LLS

LILAC

LILAC recruitment

2015