Canadian Longitudinal Study on Aging: An Example of BIG (Almost!) and DEEP DATA Research Platform

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Canadian Frailty Network Meeting, Toronto, April 23-24, 2017
# CLSA CORE TEAM

<table>
<thead>
<tr>
<th>Role</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead PI</td>
<td>Parminder Raina <em>(McMaster)</em></td>
</tr>
<tr>
<td>Co-PI</td>
<td>Christina Wolfson <em>(McGill)</em> and Susan Kirkland <em>(Dalhousie)</em></td>
</tr>
<tr>
<td>Key Site leaders &amp; Co-Investigators</td>
<td>Gerry Mugford and Patrick Parfrey <em>(Memorial)</em>, Hélène Payette <em>(Sherbrooke)</em>, Ron Postuma, Brent Richards, Mark Lathrope <em>(McGill)</em>, Larry Chambers and Vanessa Taler <em>(Ottawa)</em>, Lauren Griffith, Edwin van de Huevel, Harry Shannon, Cynthia Balion, Gui Pare, Christopher Patterson <em>(McMaster)</em>, Andrew Patterson <em>(Toronto)</em>, Mary Thompson and Chang Bo <em>(Waterloo)</em>, Debra Sheets, Holly Tuokko and Lynne Young <em>(Victoria)</em>, Verena Menec <em>(Manitoba)</em>, David Hogan, Eric Smith and Marc Poulin <em>(Calgary)</em>, Max Cynader, Teresa-Liu Ambrose and Michael Kobor <em>(UBC)</em> and Andrew Wister and Scott Lear <em>(SFU)</em></td>
</tr>
<tr>
<td>Scientific Working Group</td>
<td>See our website – <a href="http://www.clsa-elcv.ca">www.clsa-elcv.ca</a></td>
</tr>
</tbody>
</table>
WHY WE NEED BIG DATA?
Deep and Broad
Intrinsic and Extrinsic Factors

Environmental, Lifestyle, Behavioral & Social influences
(e.g., rural, socio-economic, exercise, nutrition)

Chronic diseases, Function Frailty, & disability
(e.g., diabetes, cancer, dementia, arthritis, cardio)

Inflammation & other biological processes
(e.g., telomeres/oxidative stress, psychological & cognitive abilities, immune functions)

Health & Social Services Utilization

Time (Longitudinal Study)

Genetics

Epigenetics
Need for prospective studies to be LARGE: CHD versus SBP for 5K vs 50K vs 500K people in the Prospective Studies Collaboration (PSC) (Ref: Rory Collins, UK BioBank and Lancet 2002)
What is the Canadian Longitudinal Study on Aging (CLSA)?

A research platform – infrastructure to enable state-of-the-art, interdisciplinary population-based research and evidenced-based decision-making that will lead to better health and quality of life for Canadians.
Participants (51,338)

Enrolled

Questionnaire Data (telephone and in person interviews) (>50,000)

Physical Exam and Biological Specimen (>30,000)

Active Follow-up (F) Every 3 years
- Questionnaire
- Physical exam
- Biological samples

Maintaining Contact (MC) mid-wave
- Update contact information & implement Retention strategies

Passive Follow-up Every 3 years
- Health care utilization
- Disease registries
- Mortality databases

Data and Biological Sample Repositories

Researchers

CLSA Overview

2010-2015 2015 2018

TIME
20 Years

2021 2024 2027 2031
Participant Recruitment

- Vancouver
- Victoria
- Surrey
- Calgary
- Winnipeg
- Hamilton
- Ottawa
- Montreal
- Sherbrooke
- Halifax
- St. John’s

Comprehensive
n=30,000

Tracking
n=20,000
Depth and Breadth of Baseline CLSA

**PHYSICAL & COGNITIVE MEASUREMENTS**
- Height & weight
- Waist and hip measurements
- Blood Pressure
- Grip strength, timed up-and-go, chair raise, 4-m walk
  - Standing balance
- Vision (retinal imaging, Tonometer & visual acuity)
- Hearing (audiometer)
- Spirometry
- Body composition (DEXA)
- Bone density (DEXA)
- Aortic calcification (DEXA)
- ECG
- Carotid Plaque sweep (ultrasound)
- Carotid intima-media thickness (ultrasound)
- Cognitive assessment (30 min. battery)

**HEALTH INFORMATION**
- Chronic disease symptoms *(disease algorithm)*
- Medication and supplements intake
- Women’s health
- Self-reported health service use
- Oral health
- Preventative health
- Administrative data linkage health services & drugs & other administrative databases

**PSYCHOSOCIAL**
- Social participation
- Social networks and support
- Caregiving and care receiving
- Mood, psychological distress
- Veteran’s Identifier & PTSD
- Coping, adaptation
- Injuries and consumer products
- Work-to-retirement transitions
- Retirement planning
- Social inequalities
- Mobility-life space
- Transportation
- Built environments & Contextual Factors
- Air Pollution
- Income, Wealth and Assets

**LIFESTYLE & SOCIO DEMOGRAPHIC**
- Smoking
- Alcohol consumption
- Physical activity (PASE)
- Nutrition (nutritional risk and food frequency)
- Birth location
- Ethnicity/race/gender
- Marital status
- Education
Biospecimens
42 aliquots per participant
## Demographic Characteristics of the CLSA Participants

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Tracking N=21,241</th>
<th>Comprehensive N=30,097</th>
<th>Total N=51,338</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-54</td>
<td>5832 (27.5)</td>
<td>7595 (25.2)</td>
<td>13427 (26.2)</td>
</tr>
<tr>
<td>55-64</td>
<td>6564 (30.9)</td>
<td>9856 (32.7)</td>
<td>16420 (32.0)</td>
</tr>
<tr>
<td>65-74</td>
<td>4634 (21.8)</td>
<td>7362 (24.5)</td>
<td>11996 (23.4)</td>
</tr>
<tr>
<td>75-85</td>
<td>4211 (19.8)</td>
<td>5284 (17.6)</td>
<td>9495 (18.5)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>10835 (51.0)</td>
<td>15320 (50.9)</td>
<td>26155 (50.9)</td>
</tr>
<tr>
<td>Male</td>
<td>10406 (49.0)</td>
<td>14777 (49.1)</td>
<td>25183 (49.1)</td>
</tr>
<tr>
<td><strong>Language</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>17483 (82.3)</td>
<td>24291 (80.7)</td>
<td>41774 (81.4)</td>
</tr>
<tr>
<td>French</td>
<td>3758 (17.7)</td>
<td>5806 (19.3)</td>
<td>9564 (18.6)</td>
</tr>
<tr>
<td><strong>Born in Canada</strong></td>
<td>18513 (87.2)</td>
<td>24644 (81.9)</td>
<td>43099 (84.0)</td>
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</tbody>
</table>
### Prevalence of Chronic Diseases (%) in the CLSA by Age and Sex (n=51,338)

#### Males (n=25,183)

<table>
<thead>
<tr>
<th>Age:</th>
<th>45-54</th>
<th>55-64</th>
<th>65-74</th>
<th>75-89</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory</td>
<td>13.3(^4)</td>
<td>13.9(^5)</td>
<td>12.7</td>
<td>14.1</td>
</tr>
<tr>
<td>Arthritis</td>
<td>18.4(^2)</td>
<td>29.7(^2)</td>
<td>36.5(^2)</td>
<td>42.0(^2)</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>1.1</td>
<td>2.4</td>
<td>4.2</td>
<td>5.4</td>
</tr>
<tr>
<td>HBP</td>
<td>20.8(^1)</td>
<td>36.4(^1)</td>
<td>48.5(^1)</td>
<td>54.0(^1)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>10.0</td>
<td>17.7(^3)</td>
<td>23.0(^4)</td>
<td>25.9(^5)</td>
</tr>
<tr>
<td>CVD</td>
<td>5.6</td>
<td>13.3</td>
<td>23.4(^3)</td>
<td>33.4(^3)</td>
</tr>
<tr>
<td>Cancer</td>
<td>5.2</td>
<td>10.7</td>
<td>18.8(^5)</td>
<td>30.2(^4)</td>
</tr>
<tr>
<td>GI</td>
<td>11.0(^5)</td>
<td>11.0</td>
<td>13.8</td>
<td>13.3</td>
</tr>
<tr>
<td>Stroke or CVA</td>
<td>0.8</td>
<td>1.4</td>
<td>2.6</td>
<td>4.7</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>1.4</td>
<td>3.1</td>
<td>6.9</td>
<td>12.5</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>0.8</td>
<td>3.0</td>
<td>6.4</td>
<td>9.3</td>
</tr>
<tr>
<td>Mood/Anxiety</td>
<td>17.8(^3)</td>
<td>16.4(^4)</td>
<td>12.3</td>
<td>7.7</td>
</tr>
</tbody>
</table>

#### Females (n=26,155)

<table>
<thead>
<tr>
<th>Age:</th>
<th>45-54</th>
<th>55-64</th>
<th>65-74</th>
<th>75-89</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory</td>
<td>16.5(^3)</td>
<td>17.9(^4)</td>
<td>17.5</td>
<td>17.2</td>
</tr>
<tr>
<td>Arthritis</td>
<td>24.9(^1)</td>
<td>42.7(^1)</td>
<td>51.9(^1)</td>
<td>57.9(^2)</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td>4.5</td>
<td>13.0</td>
<td>23.2(^3)</td>
<td>30.0(^3)</td>
</tr>
<tr>
<td>HBP</td>
<td>16.7(^2)</td>
<td>30.7(^2)</td>
<td>45.6(^2)</td>
<td>59.0(^1)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>9.4</td>
<td>14.5</td>
<td>17.3</td>
<td>18.2</td>
</tr>
<tr>
<td>CVD</td>
<td>3.6</td>
<td>7.3</td>
<td>13.1</td>
<td>21.5(^5)</td>
</tr>
<tr>
<td>Cancer</td>
<td>8.4</td>
<td>14.2</td>
<td>19.9(^5)</td>
<td>22.7(^4)</td>
</tr>
<tr>
<td>GI</td>
<td>14.1(^4)</td>
<td>16.0(^5)</td>
<td>17.4</td>
<td>18.5</td>
</tr>
<tr>
<td>Stroke or CVA</td>
<td>0.4</td>
<td>1.3</td>
<td>1.7</td>
<td>2.9</td>
</tr>
<tr>
<td>Urinary incontinence</td>
<td>7.8</td>
<td>10.5</td>
<td>13.4</td>
<td>18.4</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>1.5</td>
<td>2.8</td>
<td>6.0</td>
<td>11.3</td>
</tr>
<tr>
<td>Mood/Anxiety</td>
<td>24.9(^1)</td>
<td>26.9(^3)</td>
<td>20.4(^4)</td>
<td>14.5</td>
</tr>
</tbody>
</table>

\(^{n}\text{Ranking}
Canadian Longitudinal Study on Aging: Potential for BIG and DEEP DATA Research Platform

- Prospective and Retrospective Harmonization of Prospective Data Platforms
- Data Linkage
  - Health data
  - Social Data
  - List goes on…
Contact:
Parminder Raina (Lead Principal Investigator): praina@mcmaster.ca

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www.clsae-lclc.ca
CLSA Funders and Partners