Canadian Longitudinal Study on Aging: Advancing the Science of Population Health and Aging through Interdisciplinary Research
The Canadian Longitudinal Study on Aging (CLSA)

A key strategic initiative of CIHR

The Canadian Longitudinal Study on Aging

More than 160 researchers - 26 institutions

Multidisciplinary - biology, genetics, medicine, psychology, sociology, demography, economics, epidemiology, nursing, nutrition, health services, biostatistics, population health
Lead Scientific Team

Lead PI: Parminder Raina - McMaster University

Co-PI: Christina Wolfson - McGill University

CO-PI: Susan Kirkland - Dalhousie University
CLSA- The Concept

The Vision

A research platform - infrastructure to enable state-of-the-art interdisciplinary population based research and evidenced-based decision making.

The Aim

To study aging as a dynamic process and the inter-relationship among intrinsic and extrinsic factors from mid life to older age.
Innovation - Cell to Society

- Mid life to old age
- Quantitative traits
  - Physical
  - Social
  - Psychological
- Gene-environment interactions
- Disease, disability, psychosocial consequences
- Adaptation
CLSA Program of Research

- Biological Function
  - Genetics/epigenetics

- Physical Function
  - Mobility/Chronic diseases/Injury

- Psychological Function
  - Cognition/Mental Health/Coping

- Social Function
  - Work and retirement/Social Participation/Housing
Overall Aims of the CLSA

- The progression of **health** from middle-age to early old age to older old age
- The determinants of **well-being and quality of life** at older ages
- **Cognitive functioning** and **mental health** at older ages
- **Disability** and the compression of morbidity
- The examination of socioeconomic and health **inequalities** in an ageing population
- **Social participation** and **social relationships** at older ages
- **Retirement** and **post retirement** labor market activity
- **Genetics, health behaviours, expectations, life history, and determinants of SES** …
CLSA Architecture

- In-depth data collection on 50,000 (at 10 sites)
- Questionnaires, Database linkage
- Follow-up over 20 years
- Inception Cohort: 50,000
- In-depth data collection on 30,000 (at 10 sites)
- Clinical, Biological, Physical
- Every 3 years age 45-84
<table>
<thead>
<tr>
<th>Biomedical</th>
<th>Psychosocial</th>
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</thead>
<tbody>
<tr>
<td>Health status, Quality of life, healthy aging</td>
<td>Social participation</td>
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<tr>
<td>Activities of daily living/disability/injuries</td>
<td>Lifestyle/behaviours</td>
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<td>Frailty/co-morbidities</td>
<td>Social networks and social support</td>
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<td>Function/Performance</td>
<td>Care giving/Care receiving</td>
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<td>Physical measures</td>
<td>Coping, adaptation</td>
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<td>Chronic diseases and symptoms</td>
<td>Mood, psychological distress</td>
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<td>Injuries</td>
<td>Work to retirement transitions</td>
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<td>Cognitive function, Mental Health</td>
<td>Workability</td>
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<td>Oral health</td>
<td>Retirement Planning</td>
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<td>Vision, hearing</td>
<td>Job-Demand/Effort-Reward</td>
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<td>Medications</td>
<td>Social inequalities</td>
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<td>Health and Social Services Use</td>
<td>Mobility-Lifespace</td>
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<td>Institutional care</td>
<td>Built environments/physical environment/Housing</td>
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<tr>
<td>Genetics/Biology</td>
<td>Economics/Wealth</td>
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<td>o Disease susceptibility/longevity genes</td>
<td>Demographics</td>
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<td>o Epigenetics</td>
<td>o Linkage to “secondary” data bases</td>
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<td>o Biomarkers</td>
<td>o Health care use, homecare</td>
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<td>Nutrition</td>
<td>o Disease registries e.g. Cancer</td>
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<td></td>
<td>o Environmental (need development)</td>
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<td>o Contextual (need development)</td>
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<td>o Drugs</td>
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Biological Samples

- **Blood based Sample Types**
  - Serum
  - Plasma, heparin
  - Plasma, EDTA
  - Plasma, citrate
  - Whole blood, EDTA
  - Buffy coat
  - Buffy Coat with Trizol
  - Whole Blood, Acid Citrate Dextrose + Dimethyl Sulfoxide
  - Peripheral Blood Mononuclear Cells

- **Urine (no preservative)**
Participants (50,000)

Enrolled

Questionnaire Data (50,000)

Physical Exam and Biological Specimen (30,000)

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

Maintaining Contact Interview (MC) mid-wave
- Update contact information
- Short Questionnaire

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

Data and Biological Sample Repositories

Researchers
Data Collection Overview

Potential Participants Sent Study Information

Participants Consent to Participate in CLSA

Participants Provide Questionnaire Data (n=50,000)

Physical/Psychological Data
- Neuropsychological Battery
- Performance Testing
- Anthropometric Measures
- Bone Density
- Aortic Calcification
- ECG
- Carotid Intimal-Medial Thickness
- Pulmonary Function
- Vision and Hearing

Biological Data
- Blood
- Urine

n=30,000

n=20,000

Stored in Biobank (BBC) and Biomarker analysis

Stored in (NCC/SAC)

Questionnaire Data Processed

Home Interview

Telephone interview
Innovation - Cell to Society

- Mid life to old age
- Quantitative traits
  - Physical
  - Social
  - Psychological
- Gene-environment interactions
- Disease, disability, psychosocial consequences
- Adaptation
Example

Physical Function

Mobility
Mobility «activity & participation» *

Examples of precursors

**Individual (or intrinsic)**
- Chronic diseases (e.g., osteoarthritis)
- Neuropsychological conditions
- Cognition/Perceived health
- Medication use/Pain/Dizziness
  - Poor vision
  - Fear of falling/
- Obesity/Nutrition/weight loss/appetite
- Physical activity/fitness/strength
- Functional performance (measured & reported)
  - Alcohol use
- Biomarkers (inflammation, hormonal, metabolism, genetics, epigenetics)
  - Personality

**Contextual (or extrinsic or environmental)**
- Social participation
- Transportation resources
- Community/neighbourhood characteristics
- Social network/support

Examples of consequences

**Diseases**
- Osteoporosis, sarcopenia

**Physical Health**
- Injuries/Frailty/Disability
  - Poor nutrition status

**Psychological Health**
- Psychological distress
  - Quality of life
  - Loneliness
  - Unmet needs

**Social Health**
- Social participation/engagement/capital
- Work Transitions
  - Unmet needs
  - Institutionalization
Mobility

Mobility as a precursor:

Is mobility in mid- and later life associated with physical, psychological and social functioning? Specifically:

– How do changes in mobility impact upon indicators of psychological health including, depression, psychological distress, satisfaction with life, adjusting for other factors?
Mobility

Mobility as a mediator:

How does mobility in mid- and later life mediate relationships between determinants of health and health outcomes? Specifically:

– How does compromised mobility mediate the relationship between income and health?
Mobility

Mobility as an outcome:
How do physical, psychological, and social functioning in mid- and later life relate to changes in mobility? Specifically:

- What is the relationship between inflammatory biomarkers (e.g., IL-6, C reactive protein, albumin), hormonal biomarkers (e.g., IGF-1, T3, T4), metabolic (e.g., fasting glucose, cholesterol) or immunological markers (TNFα), oxidative stress (e.g. vitamin E and C), vitamin D, and (Epi) genetic markers (e.g., IGF-I and Apo-E) and changes in mobility and how is this relationship modified by SES?

- What is the relationship between neighbourhood deprivation and incident mobility disability in aging population?
Equipment and Infrastructure Supporting Research on Aging

**National Coordinating Centre**
- Oversight, project management, data management, communication for overall initiative
- Located in Hamilton

**Computer-Assisted Telephone Interview Centres**
- Collect health and psychosocial data (located in Halifax and Sherbrooke)

**Biological Processing Centre**
- Bio-banking, biomarker discovery & analysis (located in Hamilton)

**Data Collection Centres**
- Collection of nutrition, physical, clinical data, & biological specimens

**Genetics and Epigenetics Centre**
- Genotyping, epigenetic analysis, and bioinformatics (located in Vancouver)

**Statistical Analysis Centre**
- Assimilation, distribution and analysis of all CLSA data (located in Montreal)
Collaboration with Statistics Canada

- CCHS 4.2: Healthy Aging and CLSA
  - CLSA expertise for content development
  - Recruitment for CLSA
    - Release of names with written consent
    - Sharing of Data with written consent
Implementation Plans for Tracking Cohort of the CLSA
Launch of the CLSA

- First selection of 20,000 started in late 2008 in collaboration with Statistics Canada CCHS Healthy Aging module (Tracking Cohort)
  - Approximately 12,500 have agreed to release their names to CLSA

- Remaining 30,000 will be recruited in late 2010 (Comprehensive Cohort)
Tracking Cohort Timeline (2009-2015)

- CCHS 4.2 Nov 2008
- Recruitment of initial wave 12,000
- Initial wave data collection complete
- Recruit remaining sample First FU interview all 20,000
- First FU interview complete
- Maintaining contact interview complete
- Second FU interview complete


CCHS 4.2/CLSA Baseline Data survey data to NCC (n=20,000)

- Cross-Sectional Tracking Dataset Available for Analysis
- Longitudinal Tracking Dataset Available for Analysis

REB Process
CATI sites on line
Initial contact names to NCC
RFA
RFA
RFA
RFA
RFA
RFA

Canadian Longitudinal Study on Aging
Étude longitudinale canadienne sur le vieillissement
Implementation Plan for the Comprehensive Cohort (n=30,000)

- Cohort of 30,000 persons to be recruited within 25km radius of 10 data collection sites (DCS)
  - Victoria, Vancouver, Calgary
  - Winnipeg, Hamilton, Ottawa
  - Montreal, Sherbrooke
  - Halifax, St. John’s
Comprehensive Cohort Rolling Recruitment

- First batch of 1000 people to be recruited/site (mid-2011 to mid-2012)
  - Maintaining contact by phone (end of 2012-end 2013)

- Second batch of 1000 people to be recruited/site (mid-2012 to mid-2013)
  - Maintaining contact: (end of 2013-end of 2014)

- Third batch of 1000 people to be recruited/site (mid-2013 to mid-2014)
  - Maintaining contact: (end of 2014-end of 2015)
Components Comprehensive of Data Collection

- Mail information package and consent forms
- Telephone contact to recruit and set up a home visit
- Home Visit
  – Consent Process
  – Data collection using Computer Assisted Personal Interview
- Set up appointments for a visit to Data Collection Site
Comprehensive Cohort Timeline (2009-2015)

- 2009: Finalization of Documentation and Protocols
- 2010: Sample Selection Begins
- 2010: REB Approval
- 2011: Recruit and Collect Data for first 10,000
- 2012: Recruit and Collect Data for Second 10,000
- 2013: Recruit and Collect Data for third 10,000
- 2014: First Follow-up Begins
- 2015: Maintaining contact interview with first 10,000
- 2015: Maintaining contact interview with second 10,000
- 2015: Maintaining contact interview with third 10,000
- 2015: First Comprehensive Dataset Available for Analysis
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Website: www.CLSA-ELCV.ca
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