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

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Canadian Longitudinal Study on Aging
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1

CLSA CORE TEAM

Lead PI	Parminder Raina **(McMaster)**
Co-PI	Christina Wolfson **(McGill)** and Susan Kirkland **(Dalhousie)**
Key Site leaders & Co-Investigators	Gerry Mugford and Patrick Parfrey **(Memorial)**, Hélène Payette **(Sherbrooke)**, Ron Postuma, Brent Richards, Mark Lathrope **(McGill)**, Larry Chambers and Vanessa Taler **(Ottawa)**, Lauren Griffith, Edwin van de Huevel, Harry Shannon, Cynthia Balion, Gui Pare, Christopher Patterson, **(McMaster)**, Andrew Patterson **(Toronto),** Mary Thompson and Chang Bo **(Waterloo)**, Debra Sheets, Holly Tuokko and Lynne Young **(Victoria)**, Verena Menec **(Manitoba)**, David Hogan, Eric Smith and Marc Poulin **(Calgary)** , Max Cynader, Teresa-Liu Ambrose and Michael Kobor **(UBC)** and Andrew Wister and Scott Lear **(SFU)**
Scientific Working Group	**See our website – www.clsa-elcv.ca**

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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
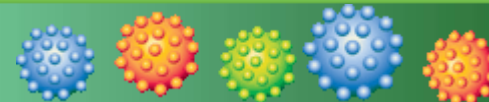(e.g., diabetes, cancer, dementia, arthritis, cardio)

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

Inflammation & other biological processes

Aging

Epigenetics

infections

Genetics

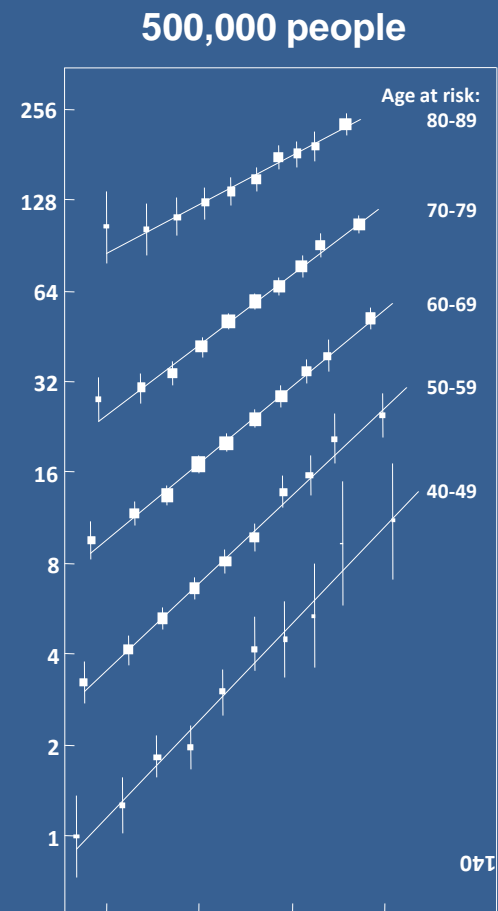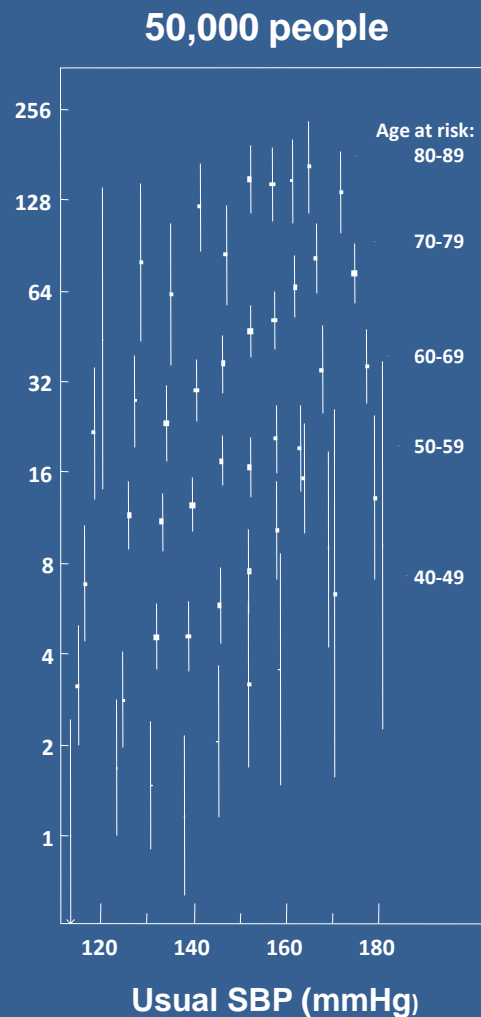Health & Social Services Utilization

Time (Longitudinal Study)

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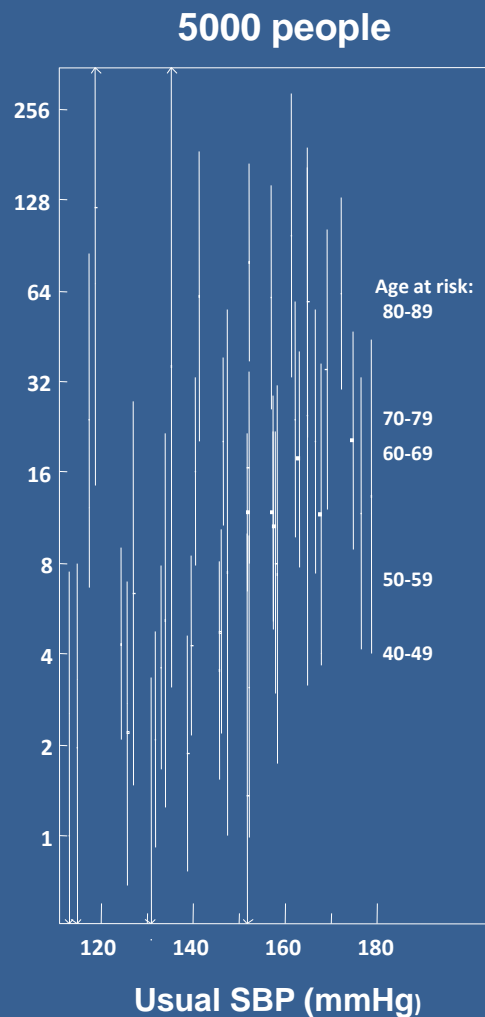Canadian Longitudinal Study on Aging
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Need for prospective studies to be LARGE: CHD versus SBP for 5K *vs* 50K *vs* 500K people in the Prospective Studies Collaboration (PSC) (Ref: Rory Collins, UK BioBank and Lancet 2002)

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

CLSA Overview

2010-2015 **2015** **2018**

Participants (51,338)

Enrolled

2021 2024 2027 2031

TIME
20 Years

MC F MC F MC F MC F MC F MC F MC F MC F

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

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Participant Recruitment

Comprehensive
n=30,000

Tracking
n=20,000

St. John's

Victoria

Vancouver
Surrey

Calgary

Winnipeg

Montreal

Sherbrooke

Halifax

Ottawa

Hamilton

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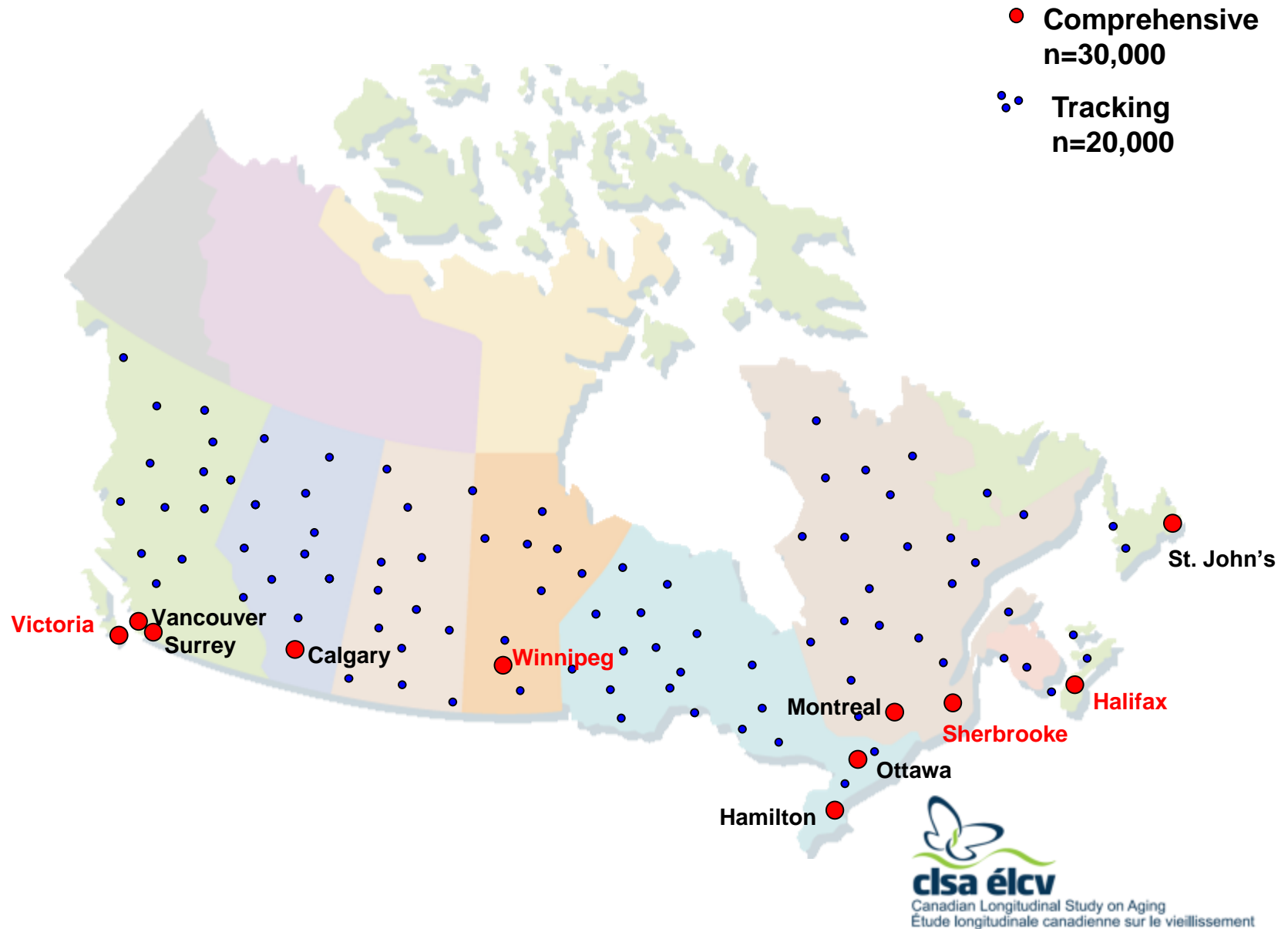
Depth and Breadth of Baseline CLSA

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 & SOCIODEMOGRAPHIC

- 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
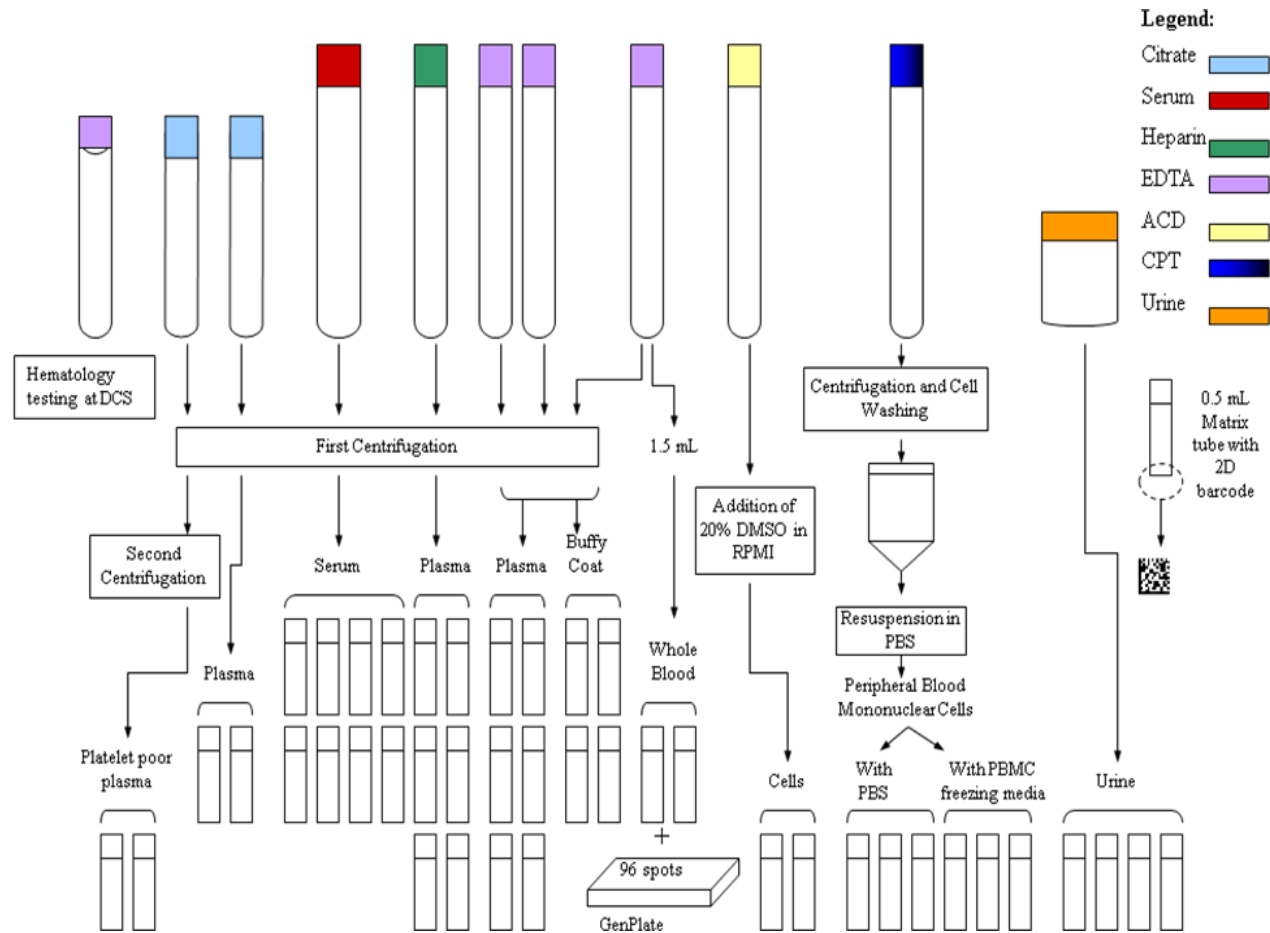
Demographic Characteristics of the CLSA Participants

	Tracking N=21,241	Comprehensive N=30,097	Total N=51,338
Age			
45-54	5832 (27.5)	7595 (25.2)	13427 (26.2)
55-64	6564 (30.9)	9856 (32.7)	16420 (32.0)
65-74	4634 (21.8)	7362 (24.5)	11996 (23.4)
75-85	4211 (19.8)	5284 (17.6)	9495 (18.5)
Sex			
Female	10835 (51.0)	15320 (50.9)	26155 (50.9)
Male	10406 (49.0)	14777 (49.1)	25183 (49.1)
Language			
English	17483 (82.3)	24291 (80.7)	41774 (81.4)
French	3758 (17.7)	5806 (19.3)	9564 (18.6)
Born in Canada	18513 (87.2)	24644 (81.9)	43099 (84.0)

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Prevalence of Chronic Diseases (%) in the CLSA by Age and Sex (n=51,338)

Males (n=25,183)

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

Females (n=26,155)

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

[n]Ranking

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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…**

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CLSA Funders and Partners