



Canadian Longitudinal Study on Aging as a Platform for Studying Transitions and Trajectories of Aging and Health

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Historians may well
conclude that the most
significant event of the
20th century was ...?

the growth of world population.

And in the 21st century,
the most significant event
may likely be ...?

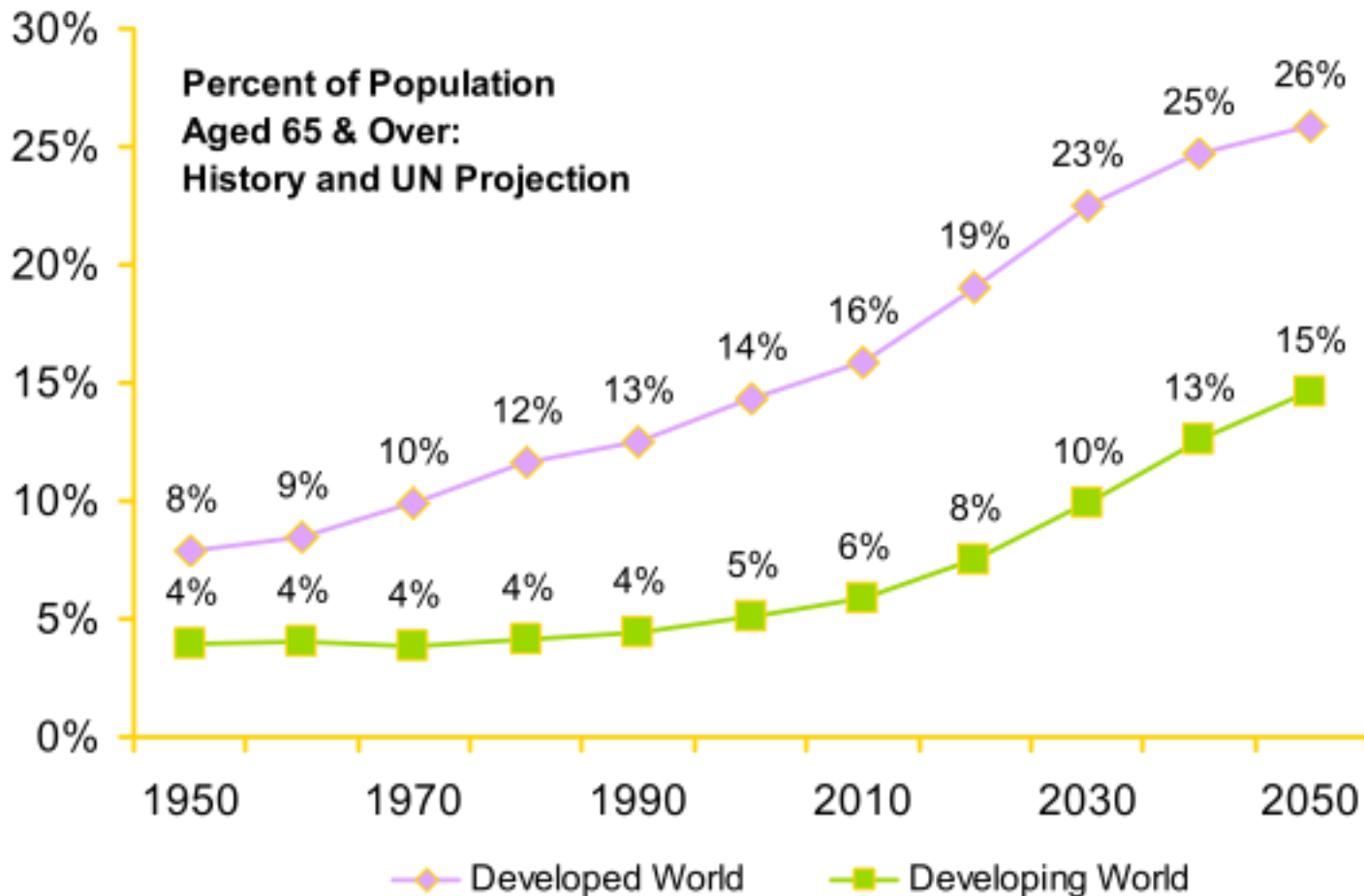
the aging of humanity.

Gender and Aging

- NUMBERS
- MORBIDITY
- POVERTY



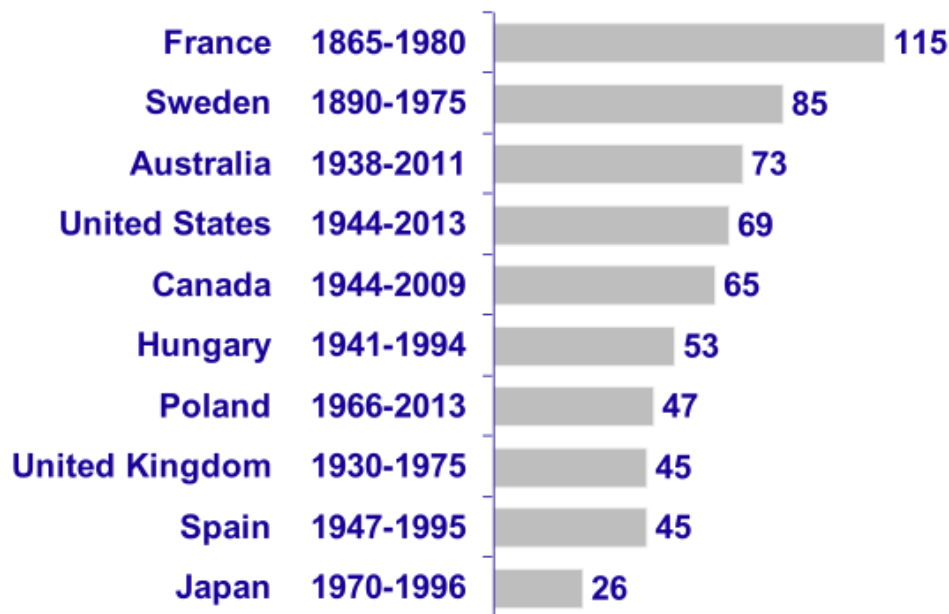
Trends in Global Aging



Source: UN (2005)

Number of Years for Percent of Population Age 65 or Older to Rise from 7% to 14%

More developed countries



Less developed countries



* Dates show the span of years when percent of population age 65 or older rose (or is projected to rise) from 7 percent to 14 percent.

Source: K. Kinsella and Y.J. Gist, *Older Workers, Retirement, and Pensions: A Comparative International Chartbook* (1995) and K. Kinsella and D. Phillips, "The Challenge of Global Aging," *Population Bulletin* 60, no. 1 (2005).

Population Totals in Canada by Age Group and Year

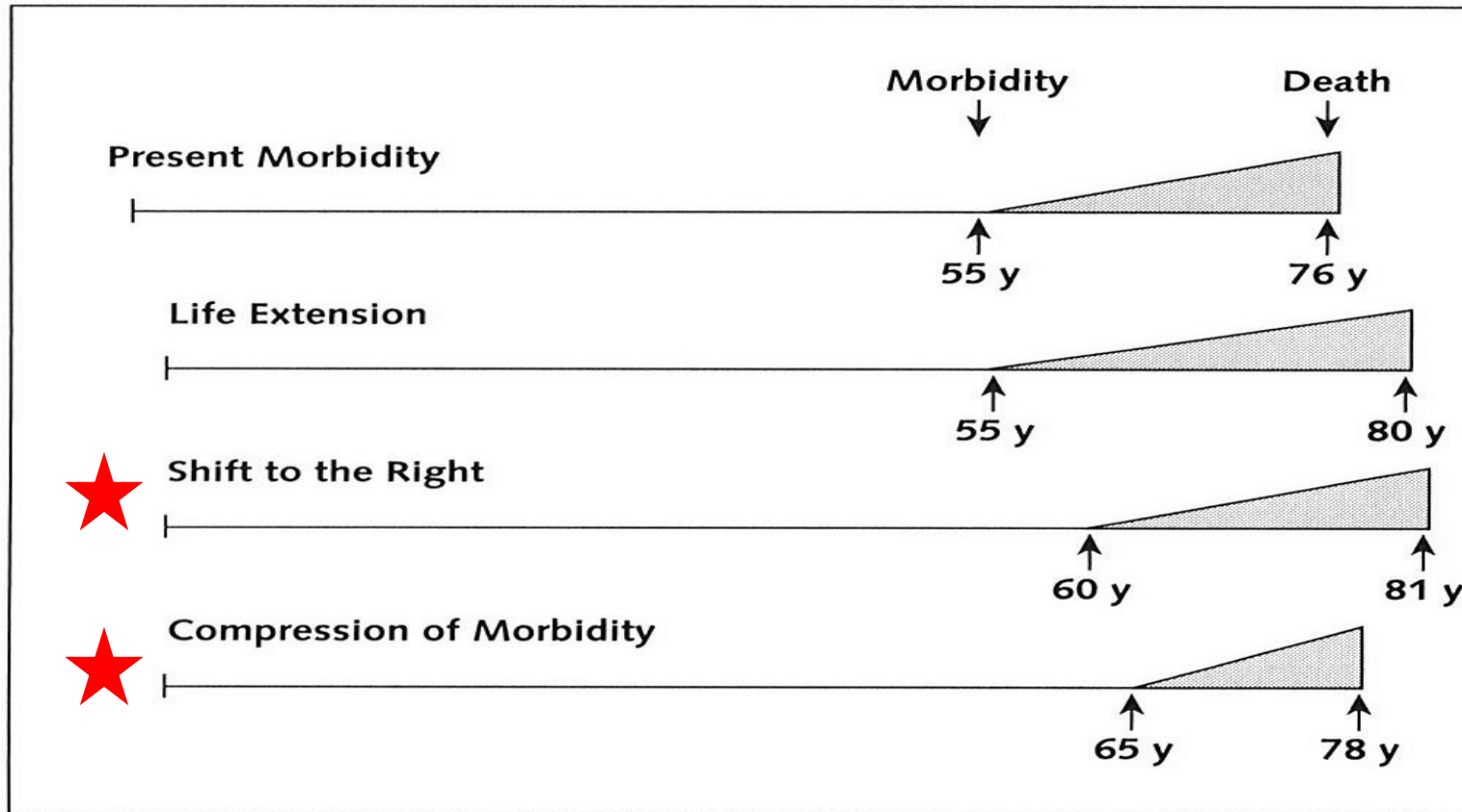
AGE	MALES	BOTH SEXES	FEMALES
80+	229898	670192	440294
75-79	255599	622194	366595
70-74	364298	833991	469693
65-69	497996	1084588	586592
60-64	578596	1190087	611491
55-59	618096	1238387	620291
50-54	673295	1339986	666691
45-49	844194	1674182	829988
40-44	1076892	2138777	1061885
35-39	1173491	2344675	1171184
30-34	1311991	2597873	1285882
25-29	1282190	2528572	1246382
20-24	1067593	2108978	1041385
15-19	984993	1925780	940787
10-14	980292	1912979	932687
5-9	998293	1953079	954786
0-4	1000393	1953280	952887
1991 TOTALS	13938100	28117600	14179500

Compression of morbidity

Fries' paradigm based on the premise that:

- The length of human life is fixed
AND
- Chronic disease can be postponed
- Predicted that the increase in life expectancy would plateau in the coming decades, particularly life expectancy from age 65 which excludes early life mortality

Fries potential scenarios



Evidence suggests otherwise

- Is average life expectancy approaching an upper limit to life expectancy?
 - the evidence that the average life span is 85 years is unconvincing
 - there is no evidence for further rectangularization of survival curves
- Will age at first infirmity increase?
 - there is no evidence for over-all declines in incidence of morbidity: on the contrary
 - evidence for actual “(de)compression” of morbidity is ambiguous

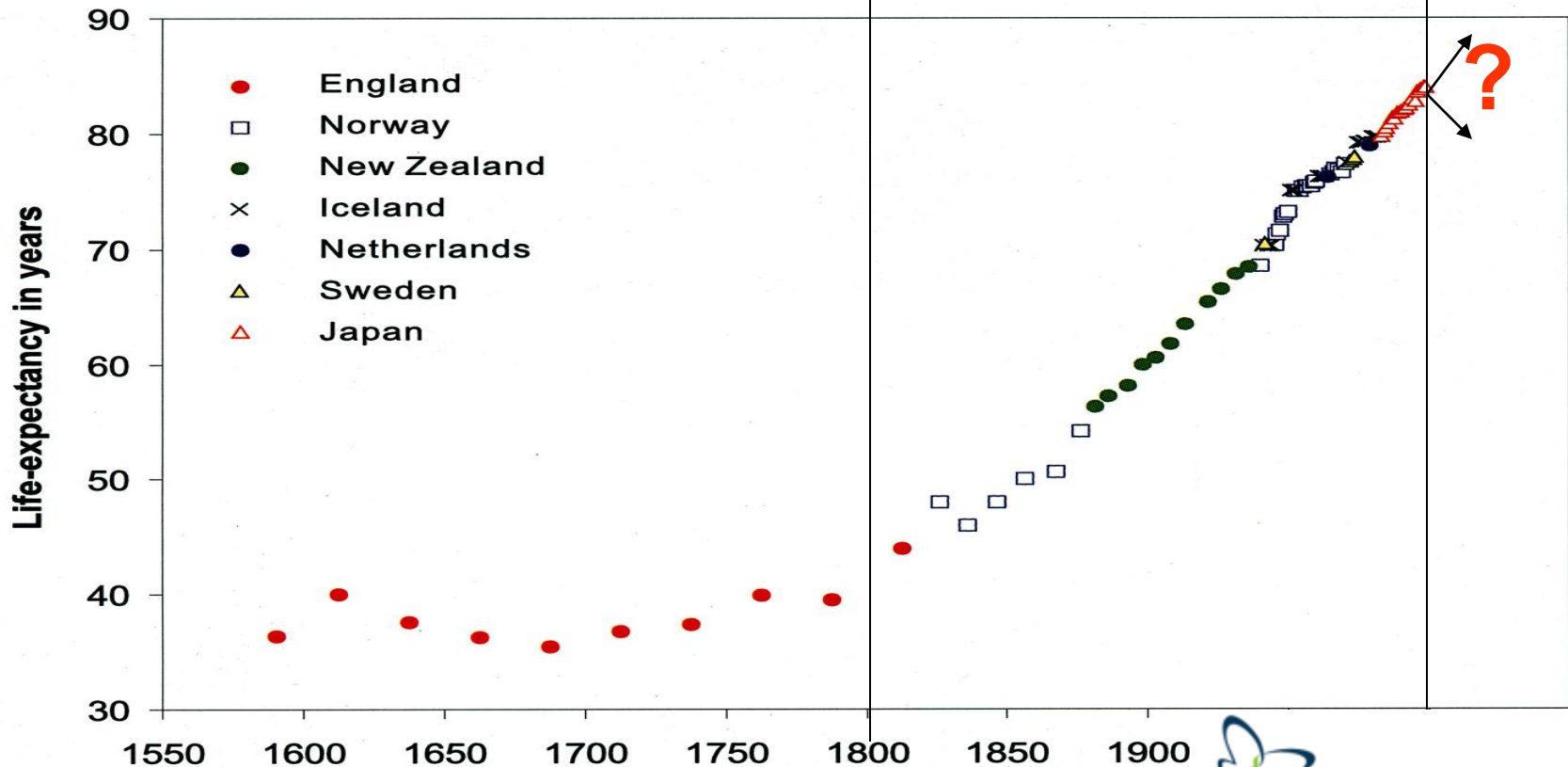
Historical increases of life expectancy

Oepen and Vaupel, Science 2002; C Finch adaptation

Phase 1
early urban

Phase 2
sanitation-nutrition

Phase 3?
regeneration
modern medicine
Social Policy Innovation



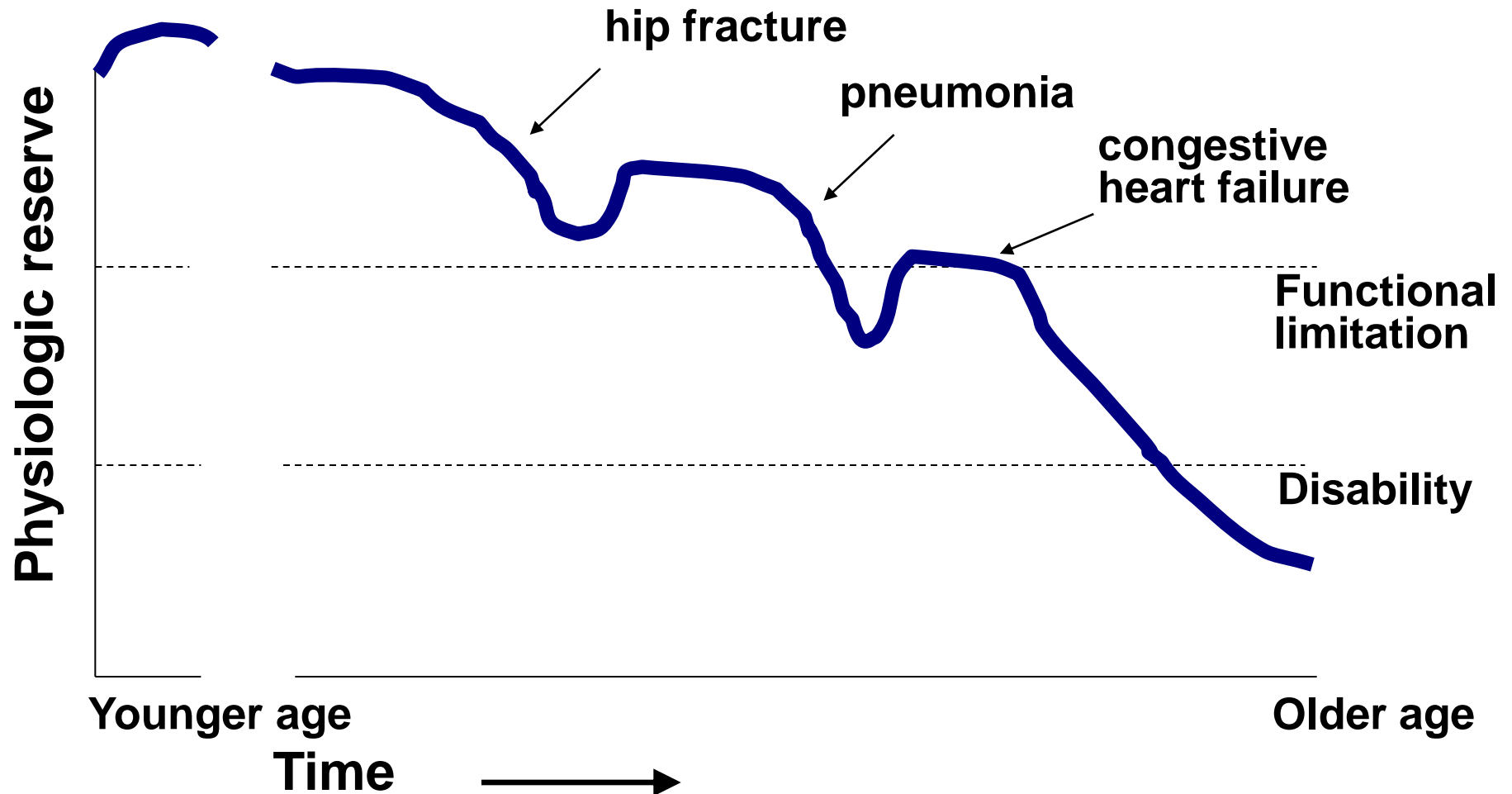
RESEARCH ON AGING

- The **demographic causes of aging** of the population, in terms of fertility rates and mortality rates, are generally predictable. A variety of population projections are available, prepared by UN, EU and National Statistic Institutes.
- What is **less predictable** is the interaction of these forces with social context, health status, economic changes, cultural influences and hence international migrations.

Risk factors for Disease, Disability and longevity

- Risk factors
 - Many factors contribute
 - Gender difference remains unexplained
 - Social inequalities
 - Age discrimination
 - Community context
 - Loss of prediction
 - Paradoxes in prediction
- New opportunities
 - Larger number of very old people
 - Longer term follow-up
 - Longitudinal data – identify optimal trajectory
 - Common risk factors

Physiologic reserve - Hypothetical Trajectory to Illness, Functional Limitation & Disability



Exceptional survival – Understanding physiologic and Social reserve

- Do systems decline together?
- Is there a common underlying “rate” of aging across organ systems?
- How physiologic vulnerabilities mitigated by psychosocial reserves?
- Is social frailty as important as physiological and functional frailty?

RESEARCH ON AGING

- For this reason further **research** on biodemography, dynamic of health, epidemiology, economics, psychology, social sciences and aging are needed.
- **Longitudinal data** are essential in order to sort causal relationships among demographic, biological, psychosocial and economic factors, and health.
- **Cross-national comparison** are important, considering variability across societies, in terms of status and well-being of older persons, experiences of health and mortality, family and social support.



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

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.



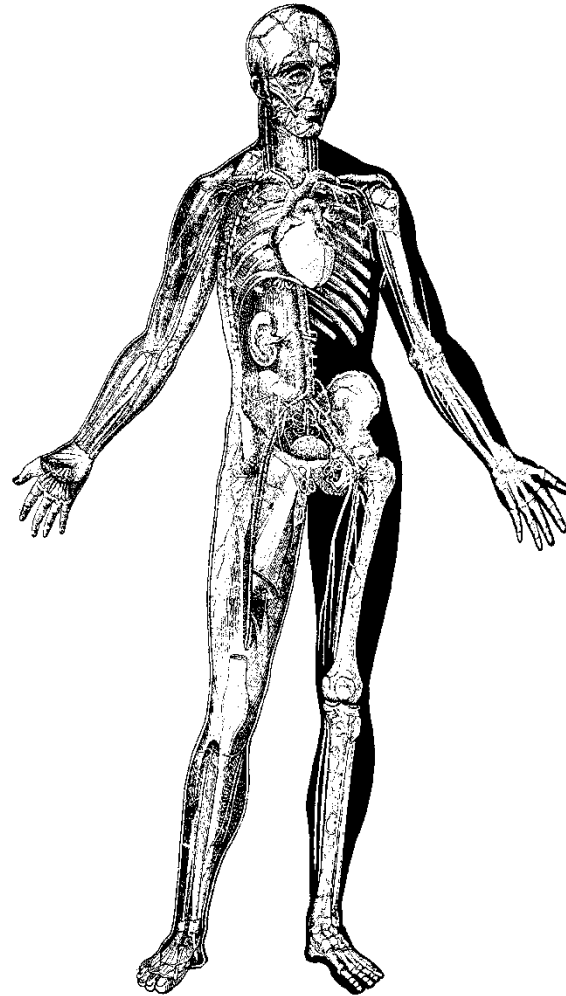
Our Aim

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

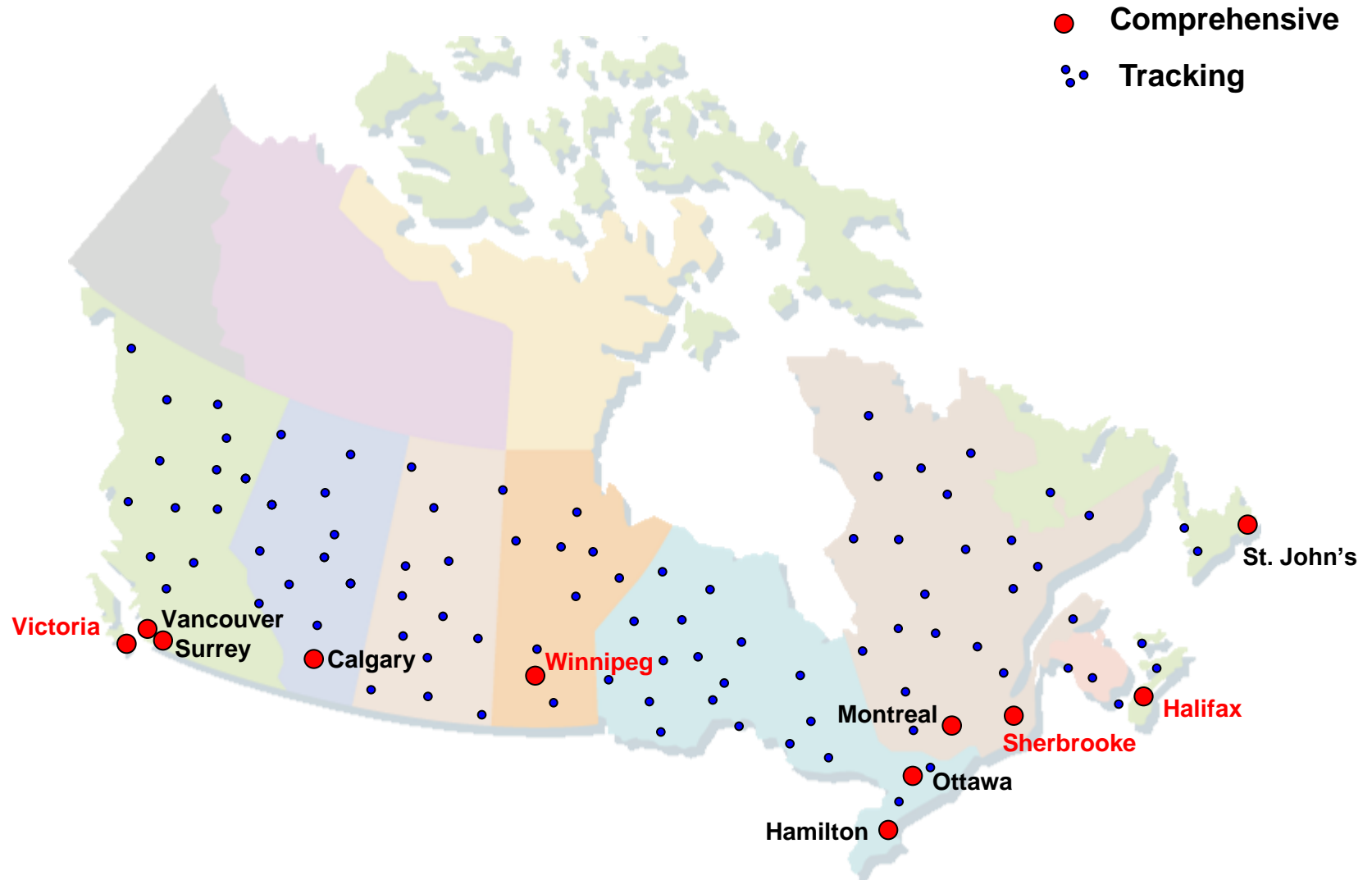
▶ Adaptation



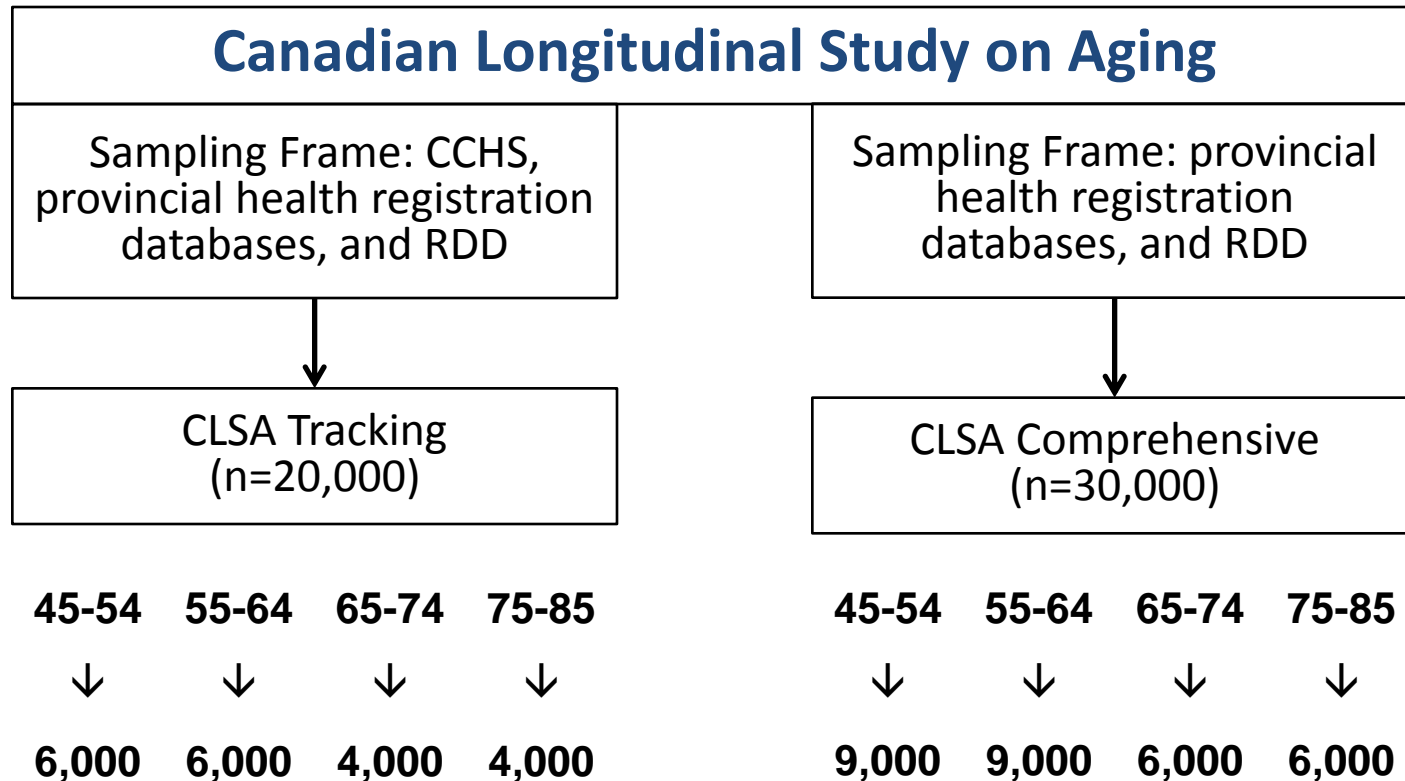
Overall Aims of the CLSA

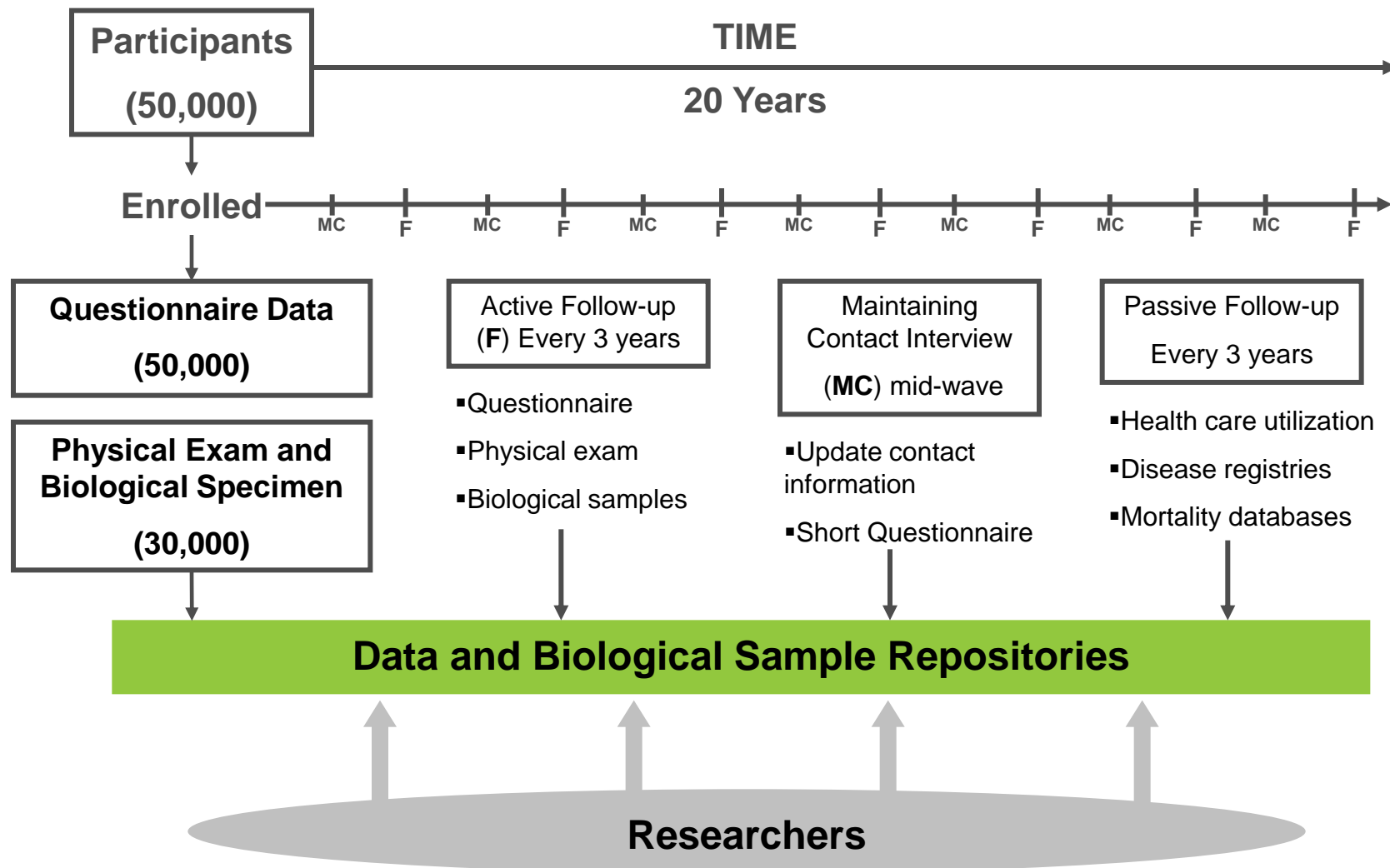
- The progression of **health** from middle-age to early old age to older old age
- The determinants of **well-being and quality of life**
- Risk Factors (including genetics) of **Chronic diseases**
- **Cognitive functioning** and **mental health**
- **Disability** and the compression of morbidity
- The examination of socioeconomic and health **inequalities** in an aging population
- **Social participation, social relationships and care giving** in an aging population
- **Retirement** and **post retirement** labor market activity

Participant Recruitment



CLSA Sampling





Depth and Breadth of 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)
- Depression
- 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

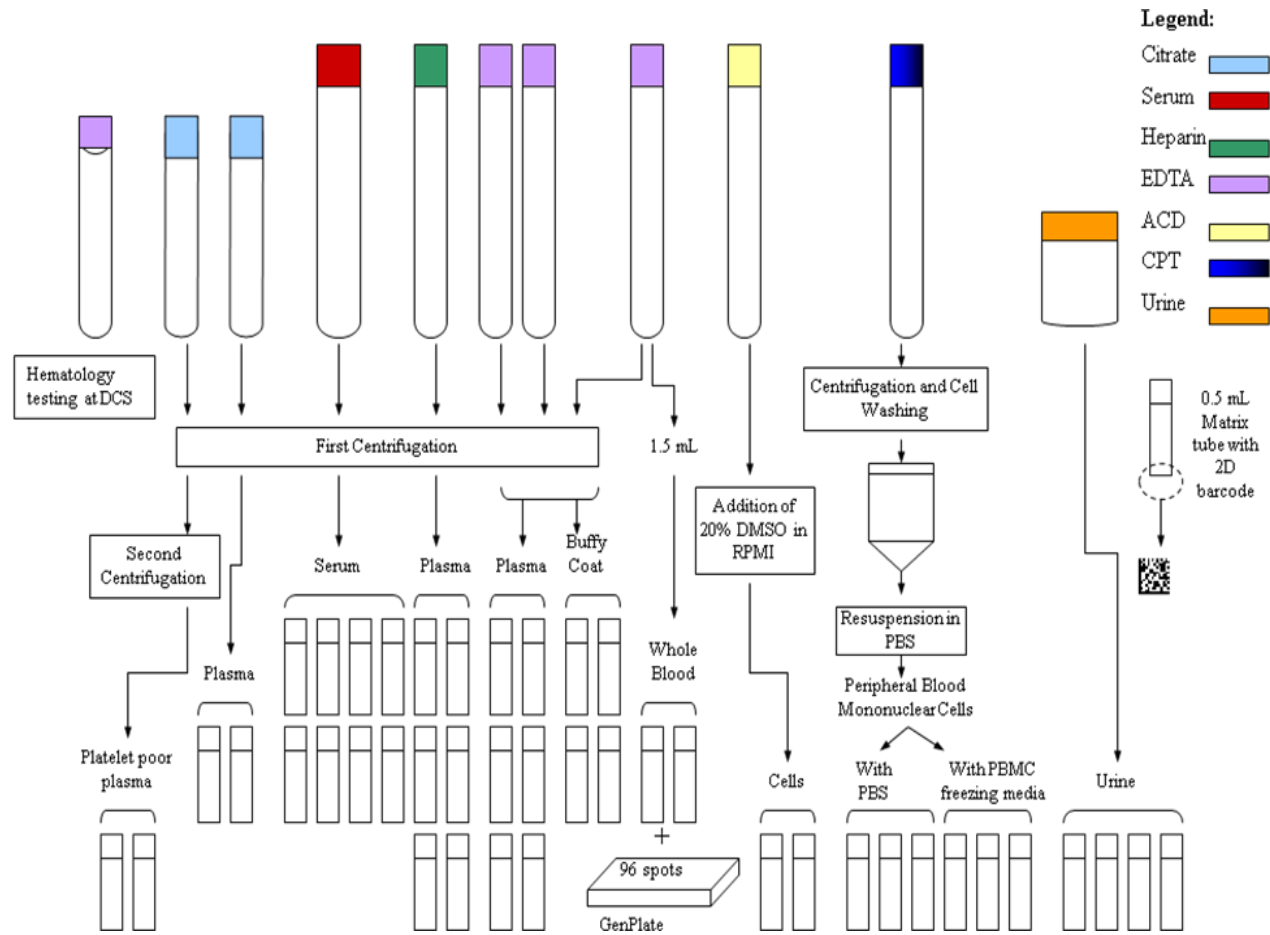
- Social participation
- Social networks and support
- Caregiving and care receiving
- Mood, psychological distress
- PTSD
- Coping, adaptation
- Injuries and consumer products
- Work-to-retirement transitions
- Retirement planning
- Social inequalities
- Mobility-lifespace
- Built environments & Contextual Factors
- 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

Bio specimens

42 aliquots per participant





CLSA Infrastructure

- National Coordinating Centre (McMaster)
- Biorepository and Bioanalysis Centre (McMaster)
- IT Infrastructure (McMaster)
- Statistical Analysis Centre (McGill)
- Genetics and Epigenetics Centre (UBC)
- 4 Computer-Assisted Telephone Interview Sites
 - Victoria, Winnipeg, Sherbrooke and Halifax
- 11 Data Collection Sites
 - Victoria, Vancouver, Surrey, Calgary, Winnipeg, Hamilton/Toronto, Ottawa, Montreal, Sherbrooke, Halifax and St.John's



Sampling and Subject Selection

CLSA collaborated with Statistics Canada to develop Sampling Strategy

- Target population: People aged 45-85 living in private occupied dwellings in the ten provinces
- Excluded:
 - Residents of the three territories
 - Persons living on Indian reserves or Crown lands
 - Persons living in institutions
 - Full-time members of the Canadian Forces
 - Residents of some remote regions

Sampling

- Choose representative sample of eligible Canadians
 - 20K Tracking cohort; 30K Comprehensive cohort
 - Specified numbers in age-sex groups by province
- Options for methods of selection:
 - Statistics Canada
 - Using provincial health registries
 - Random digit dialing

Tracking Cohort of the CLSA **(n=20,000)**

Baseline Recruitment and Data Collection

- First selection of 20,000 started in late 2011
 - Completed 60 minute questionnaire by telephone on about 20,000 individuals
 - Plan to release these data in the summer of 2014
- In August 2013 our maintaining contact interviews (30 minute telephone interview)
 - Minimize loss to follow-up
 - Collect additional data

Comprehensive Cohort of the CLSA (n=30,000)

Implementation Plan for the Comprehensive Cohort (n=30,000)

- ❖ Cohort of 30,000 persons to be recruited within 25 to 50 km radius of 11 data collection sites (DCS)
 - Victoria (3000), Vancouver (1500), Burnaby (1500), Calgary (3000), Winnipeg (3000), Hamilton (3000), Ottawa (3000), Montreal (3000), Sherbrooke (3000), Halifax (3000), St. John's (3000)
-

Comprehensive Cohort Rolling Recruitment

- ❖ First batch of 10,000 people to be recruited across all sites (Fall-2012 to mid-2013)
 - ❖ Maintaining contact by phone (end of 2013- end 2014)
 - ❖ Completed almost 18,000 In home (IH) Interviews
 - ❖ IH + Physical assessment + biosample over 16,000
 - ❖ Second batch of 10,000 (mid-2013 to mid-2014)
 - ❖ Maintaining contact: (end of 2014-end of 2015)
 - ❖ Third batch of 10,000 (mid-2014 to mid 2015)
 - ❖ Maintaining contact: (end of 2015-end of 2016)
-

Data and Sample Access

- Data and Sample Access is Open
 - All researchers have access to data
 - No special access to the “creators” of the platform
 - Individual level data versus aggregate data
 - Genetic versus Health (Depression) versus Social data
- Ethical and Legal Considerations
 - How the data are used and what purpose?
 - Public sector versus Private sector access to data

Applications to date...

- Injury and consumer products (PHAC)
- Neurologic health conditions (PHAC)
- Veteran's health (Veteran's Affairs)
- Hearing and Cognition (U of T and UBC)
- Air Pollution and Health Outcomes (Core sub-study of the CLSA)
- CLSA validation studies
- CLSA-Brain (core sub-study of the CLSA-not funded yet)

Global Observatory on Aging

- EU FP7 funded Project: Creating a network of about 30 cohorts across Canada, Europe, Israel, China, and USA
 - CHANCES: Healthy Aging (already funded)
 - 10 Cohorts (Harmonization)
 - Part of several applications to EU for March 2014 competition
 - Multi-morbidity
 - Frailty biomarkers
 - Urbanization and Aging

CLSA CORE TEAM

Lead PI	Parminder Raina (McMaster)
Co-PI	Christina Wolfson (McGill) and Susan Kirkland (Dalhousie)
Key Site Co-Investigators	Gerry Mugford and Patrick Parfrey (Memorial), H��l��ne Payette (Sherbrooke), Ron Postuma, Brent Richards, Mark Lathrope (McGill), Larry Chambers and Vanessa Taler (Ottawa), Lauren Griffith, Harry Shannon, Cynthia Balion, Paola Mutti, Mike Veall, Christopher Patterson, (McMaster), 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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www.clsa-elcv.ca

