Study of Osteoporotic Fractures* and Cohorts for the Biology of Aging

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Supported by NIA and NIAMS (thank you!)

SOF
The Great Grandmother of Cohort Studies

- Since 1986, 10,000, ≥65 followed **30 years**

Want to talk about SOF?

- Kris Ensrud, MD, MPH

- Jane Cauley, DrPH

- Peggy Cawthon, PhD

They also speak “MrOS”

What's unique about SOF?

- Visits q 2-4 years – no more clinic site visits
- Many direct measurements of aging
  - BMD
  - Cognition, dementia (adjudicated)
  - Objective measures of sleep
  - Circadian activity rhythms
  - Vision, hearing
  - Performance tests (gait speed)
  - Expertise in trajectories of longitudinal data
- Serum at multiple time points and DNA

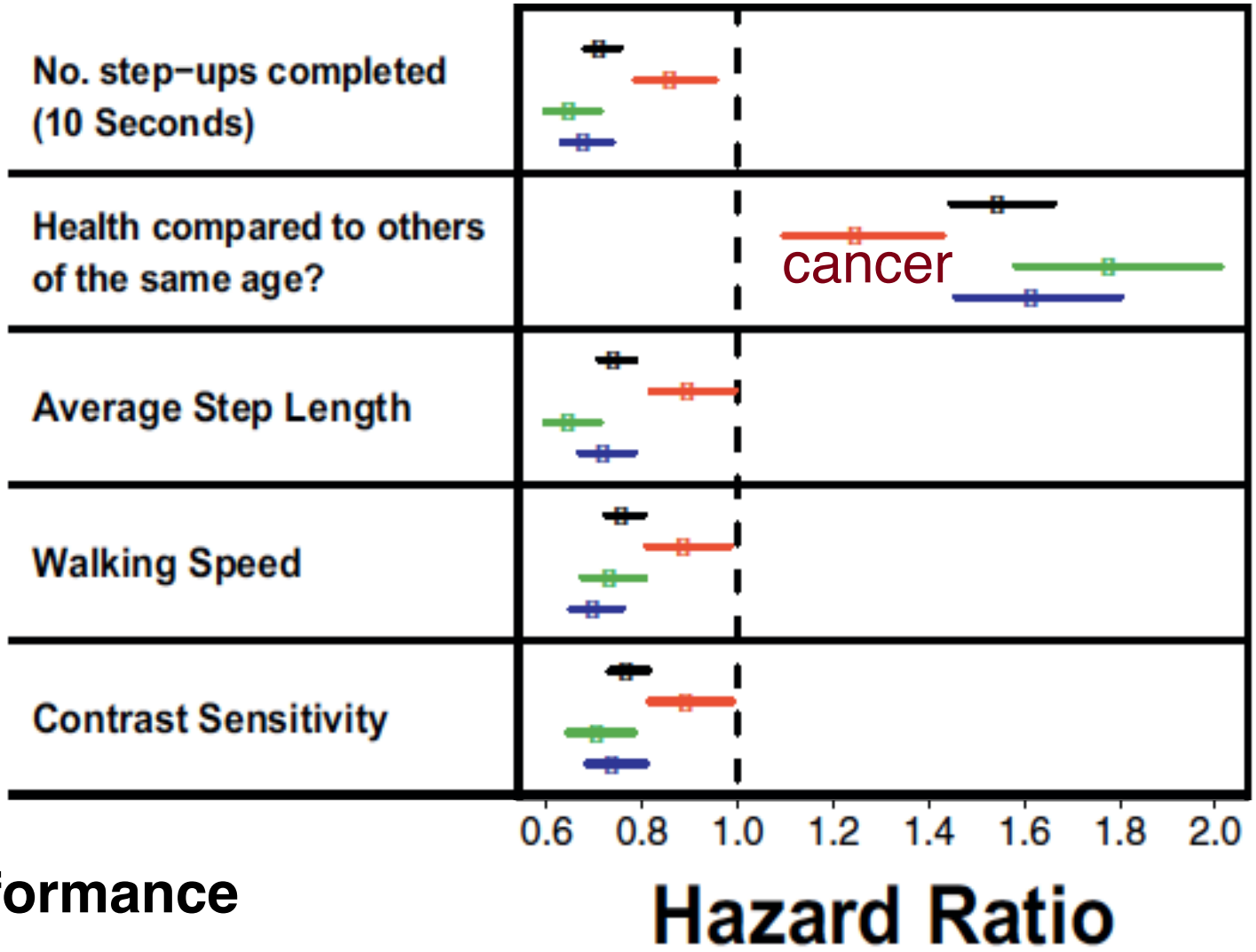
Aging outcomes

- Hip fracture (1,700), all (8,000), falls (>25K)
- Dementia
- Frailty
- Costs of health care

Value of direct measurements

- Determinants of survival
- Assumption free statistical mining of nearly 400 candidate age-related variables
- Index of aging

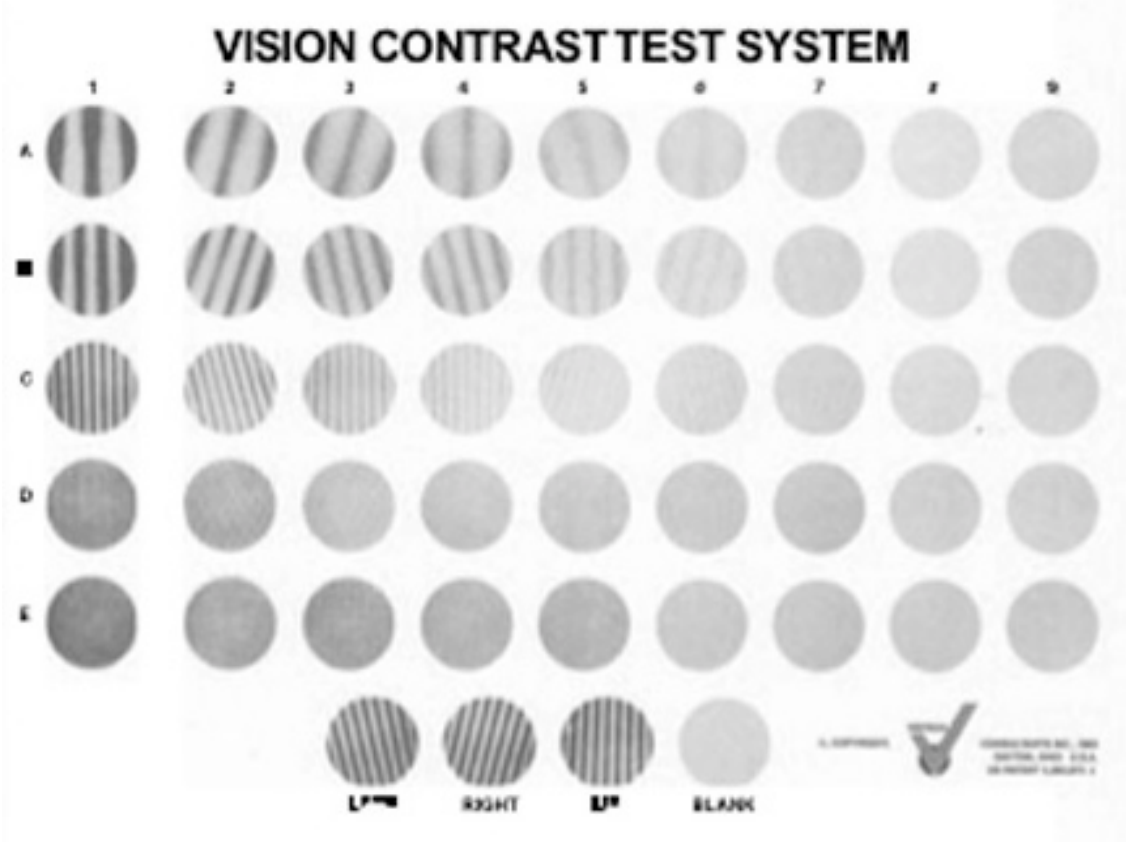
Components of the SOF Index direct measurements



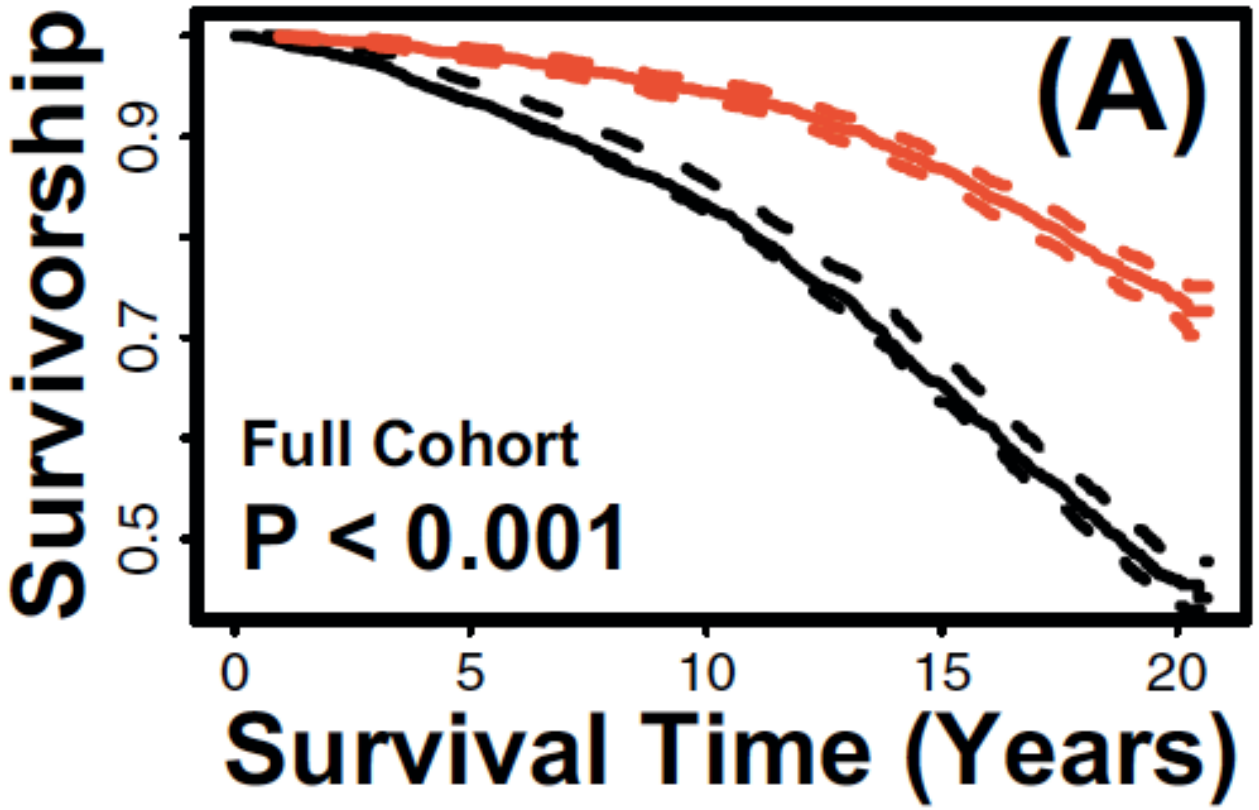
Performance

Contrast sensitivity
A window into the brain?

- Measures retinal atrophy
- Correlated with atrophy of the hippocampus



SOF Index: very strong predictor of 20 year mortality



Healthy Aging Index

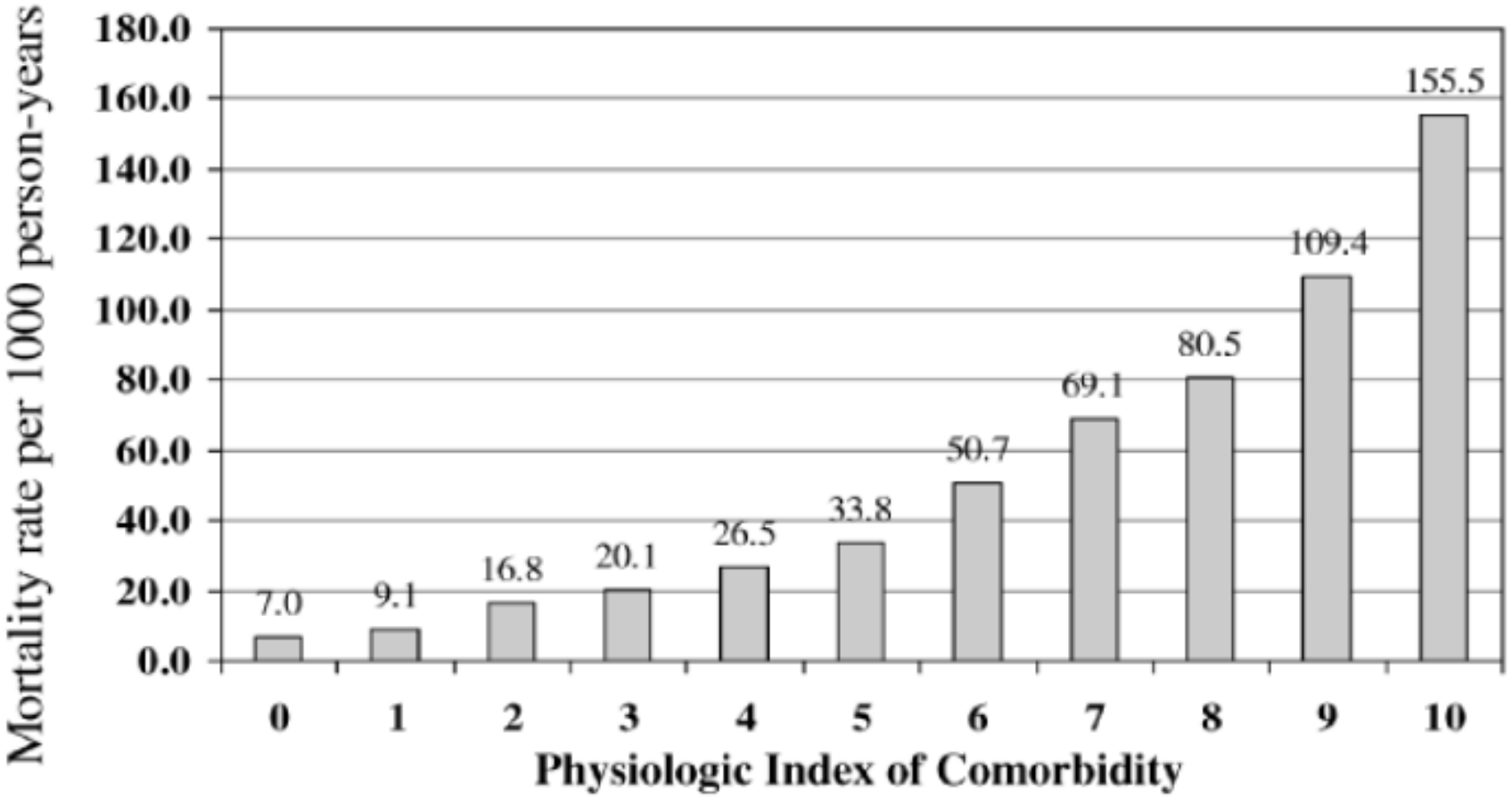
From CHS (Anne Newman)

Physiologic index

- FVC (pulmonary function)
- Carotid wall thickness
- Cystatin-C (renal function)
- White matter grade (brain MRI)
- Fasting glucose

Tertiles: 0=best, 2=worst. Score: 0 to 100

Healthy Aging Index is a strong predictor of mortality



An Index of Biological Aging

- Very valuable for drug development
- Discovery of targets: the genetic and blood-based determinants of the rate of aging
- Testing potential drugs: a surrogate marker for proof of concept, phase 2 dose selection

SCIENCE

Billionaires With Big Ideas Are Privatizing American Science

By WILLIAM J. BROAD MARCH 15, 2014

Private funding

- Companies with very large budgets are investing
  - New measurements in current cohorts
  - New cohorts with next gen biology, devices

Google X, Life Sciences

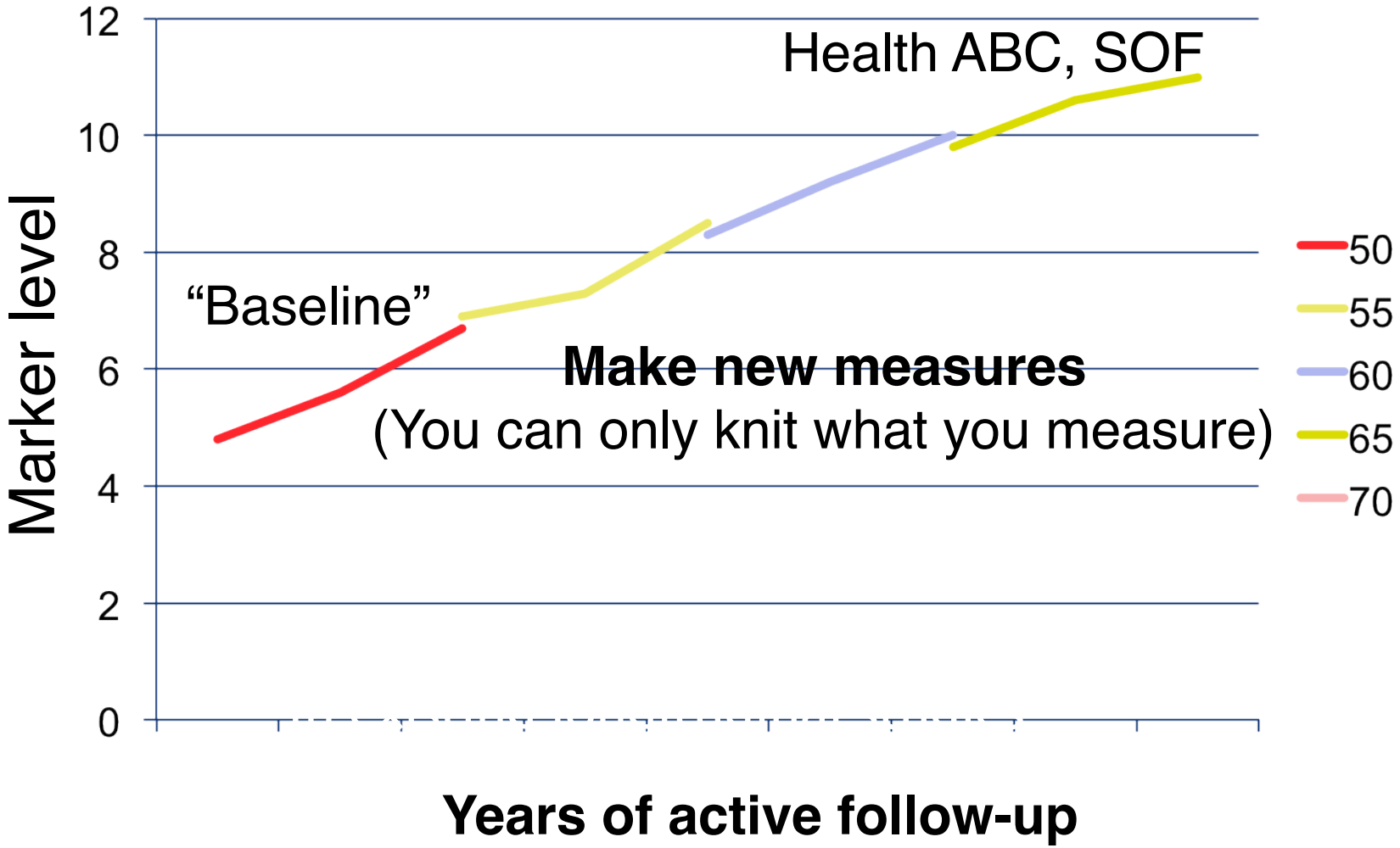
TECHNOLOGY

Google's New Moonshot Project: the Human Body

Baseline Study to Try to Create Picture From the Project's Findings

- "Baseline" Cohort Study
  - Cohort of 10,000 and growing
  - Intensive measurement and sample collection

Potential linked trajectories of measurements (knitting)

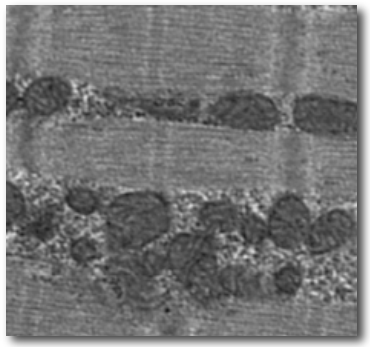


We need new cohorts for the study of the human biology of aging

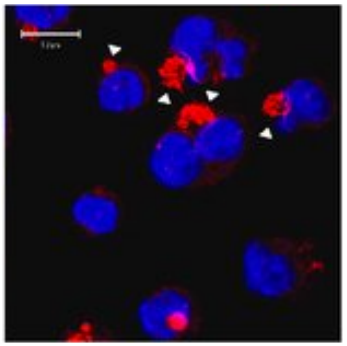
- Go beyond the limits of current cohorts
- “EMR Epidemiology” will have very limited phenotyping
- Examine human cells
- Include laboratory scientists

New cohorts for human aging

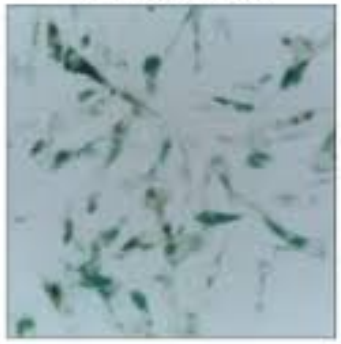
- Measure key pathways of cell biology



Mitochondria



Autophagy



Senescence

- Needs cells (muscle, fat, sorted blood cells) for functional studies), advanced imaging, physiology and performance tests
- Needs large size for key outcomes: healthy longevity, mobility disability, falls, frailty

Summary
Cohorts for Translational Study of Aging

- Talk with SOF and MrOS about studies of aging and bone
- Private groups might invest in cohorts, to aid develop and test treatments and devices