China Health and Retirement Longitudinal Study (CHARLS)
Study Name: China Health and Retirement Longitudinal Study (CHARLS)

- PI: Yaohui Zhao, John Strauss
- Biological data personnel: Perry Hu, Eileen Crimmins, John Strauss, Qinquin Meng, Yuan Zhang
- General design: Longitudinal cohort study
- Demographics: national sample: 45+ in 2011, refresh sample
- Survey domains: HH interview, community survey, policy survey (county level), physical assessment, venous blood collection, exit interview, verbal autopsy
Brief History

- **2008**: Pilot Study 2 Provinces
- **2009**: Pilot Study follow-up
- **2010**: National Sample Baseline
- **2011**: National Sample 2nd wave
- **2012**: National Sample 3rd wave
- **2013**: Life History Survey
- **2014**: Village History Survey
- **2015**: Cognitive & Dementia Assessment
- **2016**: National Sample 4th wave

**DBS**
- Anthropometric measures
- Physical Assessments

Total sample size: 17,708
- VBS (N=11,847)
- Anthropometric measures
- Physical Assessments

Total sample size: 20,284
- VBS (N=13,013)
- Anthropometric measures
- Physical Assessments
Existing biomarkers

• Blood based biomarkers from venous blood sample (2011 and 2015)
  - hsCRP, HbA1c, total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides, glucose, blood urea nitrogen, creatinine, uric acid, cystatin C.
  - CBC

• Non-blood based biomarkers (2011, 2013, and 2015)
  - Anthropometric measurements: height, weight, waist circumference, knee height, and arm length
  - Blood pressure, pulse rate, lung peak flow, grip strength, timed sit-to-stand, timed walk, and balance measures
Specimen Collection Procedures for 2015

• Nurses or phlebotomists collected venous blood at centralized locations (94%, remaining 6% in homes).

• Overnight fasting requested (85% did), but we took blood even if they had not fasted.

• 3 tubes of venous blood collected
  • 2 mL tube for CBC test - transported to the laboratories under ambient temperature. The median time from blood collection to CBC assay was 107 minutes.
  • 6 mL tube of whole blood for kept under 4°C until centrifuged at local hospitals or health centers - median time from collection to centrifugation was 78 minutes. Plasma was stored in two 1 mL cryovials and the buffy coat in a separate cryovial. These cryovials were immediately stored frozen at -20°C until they were picked up by a cold chain company.
  • 2 mL tube was collected for the HbA1c assay. This 2 mL tube of whole blood was stored under 4°C until the tubes were picked by the cold chain company.
Specimen Collection Procedures for 2015

• Plasma, buffy coat, and whole blood for HbA1c were collected by the cold chain company within a median of 5 days and more than 2/3 of the specimens were in a week or less. These specimens were shipped with dry ice. The median shipping duration from various counties to Beijing University was 48.6 hours.

• Shipped with temperature monitors
Illustrative temperature patterns during specimen shipment, CHARLS wave 3:

- Only two shipments had recorded temperature above 0°C for 3 hours and 33 hours respectively
Issues from last round

• Overall great experience working with a commercial clinical laboratory, but staff at commercial laboratories may not have as much experience working with frozen specimens. So, real-time monitoring and supervision of the laboratory is very important.

• Change in laboratories across waves and changes in assay platform in the same laboratory may affect comparability of assay results over time.
  • Clinical laboratories typically do not focus on longitudinal analysis
  • Need to prepare for cross-calibration across study waves
Proposed Biomarkers from stored samples

• None
Future Plan – 2021 wave

• **Blood based biomarkers from venous blood sample** - to be determined
  - hsCRP, HbA1c, total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides, glucose, blood urea nitrogen, creatinine, uric acid, cystatin C.
  - CBC

• **Non-blood based biomarkers**
  - Anthropometric measurements: height, weight, waist circumference, right lower leg length, and arm length
  - Blood pressure, pulse rate, lung peak flow, grip strength, timed sit-to-stand, timed walk, and balance measures
Mortality Follow-up

• All respondents are sought for interview every wave

• Exit interview
  - Dates of death
  - Health before death
  - Health care utilization before death

• Cause of death – verbal autopsy interview
  - 2012 WHO verbal autopsy instrument
  - Written narrative text: reports from survivors