BIOLOGICAL MEASURES IN THE HEALTH AND RETIREMENT STUDY

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HRS | HEALTH AND RETIREMENT STUDY

HRS WORKING GROUPS FOR BIOLOGICAL MEASURES

- Biomarkers
  - Eileen Crimmins, Jessica Faul, Bharat Thyagarajan
- Genetics
  - Sharon Kardia, Jennifer Smith, Jessica Faul, Wei Zhao, Erin Ware, Colter Mitchell
- Health
  - Eileen Crimmins, Jessica Faul, Ken Langa, Bob Wallace
- Also extensive collaboration with USC-UCLA Biomarker network:
  - Teresa Seeman, Jung-Ki Kim, Perry Hu, Steve Cole, Heather McCreath, Alan Potter

WHY

Biological measures are of interest in studies of aging human populations for

- Improved accuracy over self-report of health status and behaviors related to risk of disease or care needs
- Measurement of biological factors in the pathway between social/environmental exposures and outcomes of aging
- Measurement of biological factors external to that pathway that may constrain its operation (e.g., “pure” biological differences in risk, some forms of GxE)

BRIEF HISTORY

- No biomeasures before 2002
- Two supplement studies 2002-04
  - ADAMS – ApoE
  - Diabetes study – HbA1c
- Major redesign I in 2006: Enhanced FTF Interview
  - Physical and performance measures
  - Saliva samples for DNA
  - Dried blood spots for assays
- Half-sample rotation
  - “A” sample in 2006, 2010, 2014, 2018, (2022)
  - “B” sample in 2008, 2012, 2016, (2020)

EFTF INTERVIEW

- Physical and performance measures
  - Blood pressure
  - Height, weight, waist circumference
  - Puff test, grip strength, balance test, timed walk (65+)
  - HearCheck hearing test (2016)
- Saliva (Oragene) for DNA
- Blood spots (2006-16)
  - HbA1c, CRP, Cystatin-C, Total and HDL cholesterol
  - IL-6 (2014, 2016)

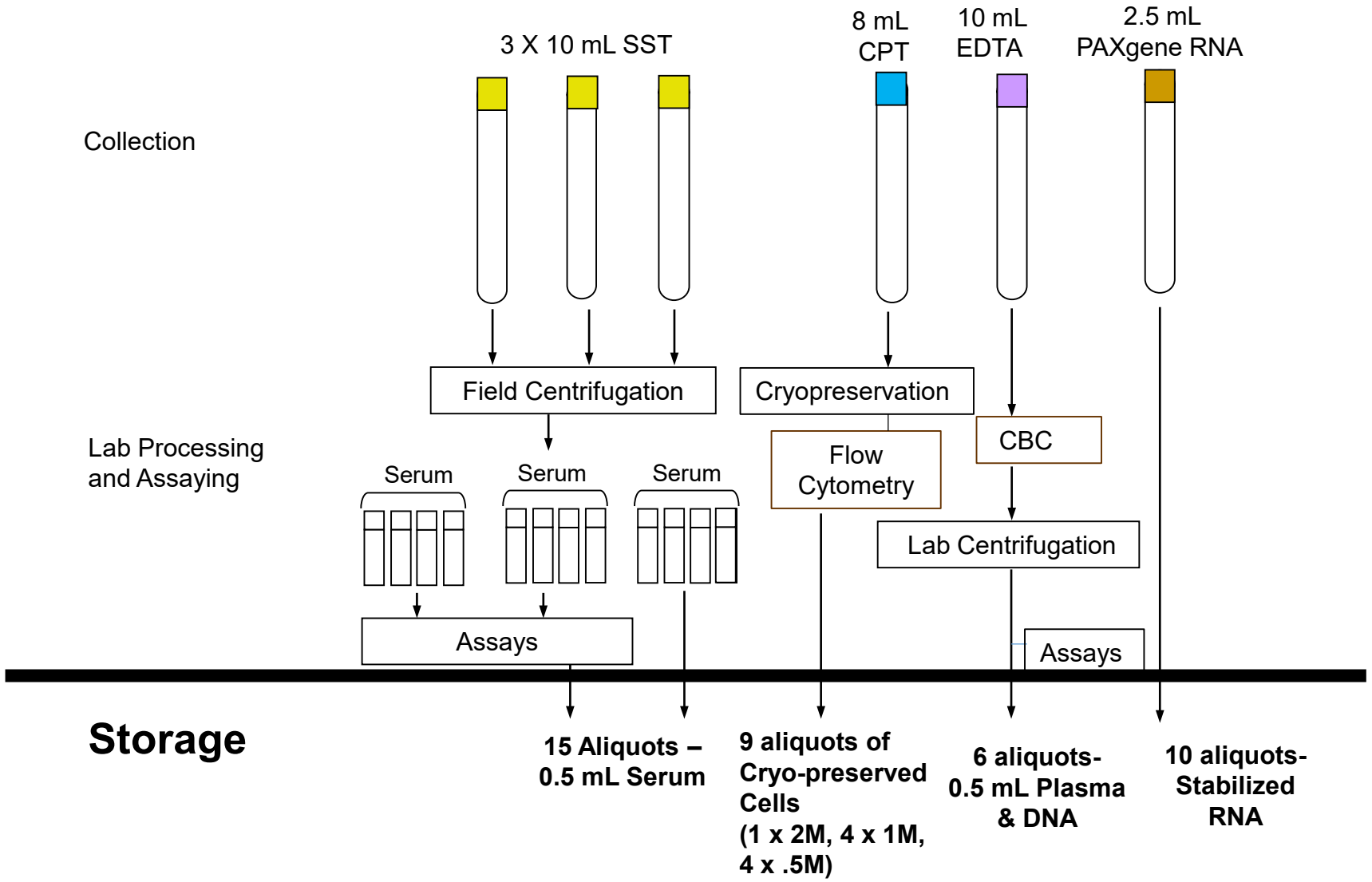
HRS – GENETIC DATA PRODUCTS

- Full GWAS+exome data deposited at dbGaP
  - 254 authorized user groups
  - Slow to add data
- Polygenic scores
  - Robust construction methods, shared with other studies
  - Can be done for any trait with good published GWAS, not just those you measure (in fact you don’t want to use GWAS results that include your study)
  - (relatively) up to date on HRS sample and published literature
  - Distributed by HRS

MAJOR REDESIGN II IN 2016: VENOUS BLOOD

- Venous blood collection by contract phlebotomists in separate visit starting in 2016
- Goal is one draw per respondent every six years
- Repository the primary destination; some essential assays as part of initial collection, others as funding permits
- Dried blood spots dropped from EFTF starting 2018

HRS Venous Blood Collected – 50.5 mL



VBS Assays from 2016 Supplement

Assays released December 2017, full sample (n~9900)

http://hrsonline.isr.umich.edu/index.php?p=shoavail&iyear=ZQ

- Metabolic Panel, Lipid Panel, CBC
- CRP, Cystatin C, Ferritin, DHEA-S, CMV, B-type natriuretic peptide

Completed Assays - In QC, being prepared for release, full sample

- Flow cytometry
- Cytokines (IL-6, IL-1RA, IL-10, TNF-alpha, sTNFR-I and TGF beta [activated form])
- Insulin-like growth factor (IGF-1)
- Vitamin D

Innovative sample (n~4,100)

- DNA methylation (Illumina EPIC)
- Telomeres
- RNA Seq
- mtDNA copy number
- Homocysteine, Clusterin, Brain-derived Neurotrophic Factor (BDNF)

Good source for more information: user guides on HRS website

https://hrs.isr.umich.edu/documentation/user-guides

- **Biomarkers**
  - Crimmins EM, Faul JD, Kim JKi, Weir DR. Documentation of Biomarkers in the 2010 and 2012 Health and Retirement Study.
  - Crimmins EM, Faul JD, Thyagarajan B, Weir DR. Venous Blood Collection and Assay Protocol in the 2016 Health and Retirement Study.
- **Cognition**
  - Ofstedal MB, Fisher GG, Herzog AR. Documentation of Cognitive Functioning Measures in the Health and Retirement Study
  - Weir DR, Langa KM, Ryan LH. 2016 Harmonized Cognitive Assessment Protocol (HCAP) Study Protocol Summary
- **Mortality follow-up**
  - Weir DR. Validating Mortality Ascertainment in the Health and Retirement Study