

Design & scope of ongoing & Future Collaborations:

The Framingham Heart Study



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The Framingham Heart Study

Boston University School of Medicine

No Conflicts to Disclose



Framingham Heart Study

- **Longitudinal**
 - Lifetime measures & Lifestyle measures
 - Lifetime risk
 - Trajectories, cumulative exposure, temporal trends
- **Deeply Phenotyped**
 - FHS is ~ The Human Phenome Project
- **Extensive Genetic/Genomic Resources**
 - Unique tissue resources
- **Family-based study**

FHS: Dense Phenotypic Characterization

Funded grants

Dementia
Stroke

Cardiac

Pulmonary

Vascular

Osteoporosis

Osteoarthritis

Alcohol

Transcriptome

Cancer

Depression

Hearing

Eye

Endocrine

Aging

CMS

Diabetes

Methylome

Proteome

Metabolome

The Human Phenome Project

Now... Waiting for collaborations!!



Genomic Resources

- Marshfield genome scan (~400 markers/every 10cM)
- GWAS: 100K, 550K imputed to 1000K, 5M Omni
- Exome Chip Illumina v1.0
- Whole Exome Sequences
- Whole Genome Sequences
- MediSeq
- Candidate genes/SNPs
- iPS cell lines soon

Access locally if working at BU

Or through dbGaP

<http://www.ncbi.nlm.nih.gov/gap>

SABRe CVD Initiative: Resources

- **High-throughput technology to measure**
 - **Project 1: Discovery proteomics, metabolomics & lipomics**
 - **Project 2: Targeted immunoassays**
 - **Project 3: Gene expression profiling**
 - **Project 4: microRNA profiling**

Gene Expression	Methylome	Metabolome	miRNA	Protein Biomarkers*
5,622	2,726	2,650	5,718	7,315

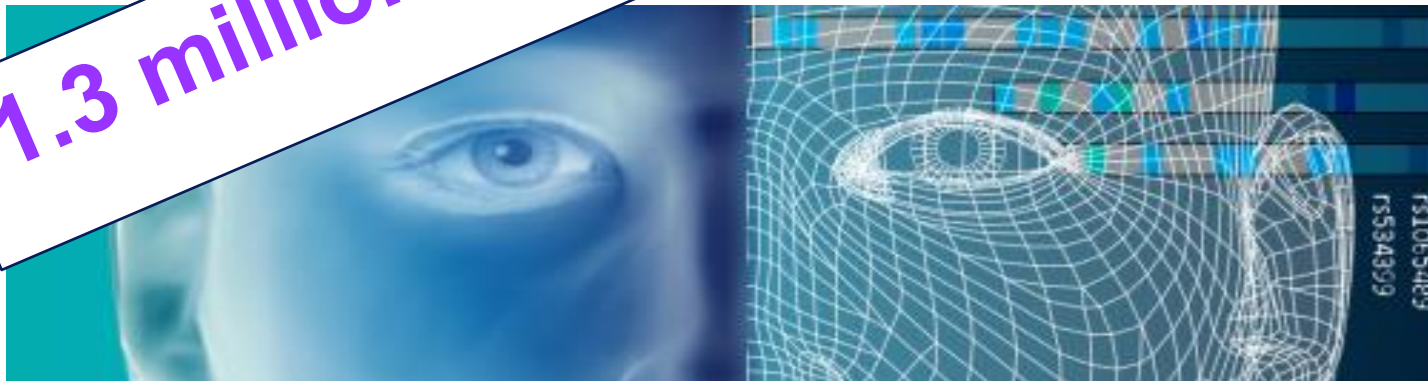
***170 immunoassay proteins.**

Framingham Heart Study Biorepository

- Core mission: Preservation, tracking/distribution and appropriate utilization of biological specimens collected from FHS participants

- Compilation and QC of research measures for submission to central repositories and for use by investigators (e.g., BioLINCC)

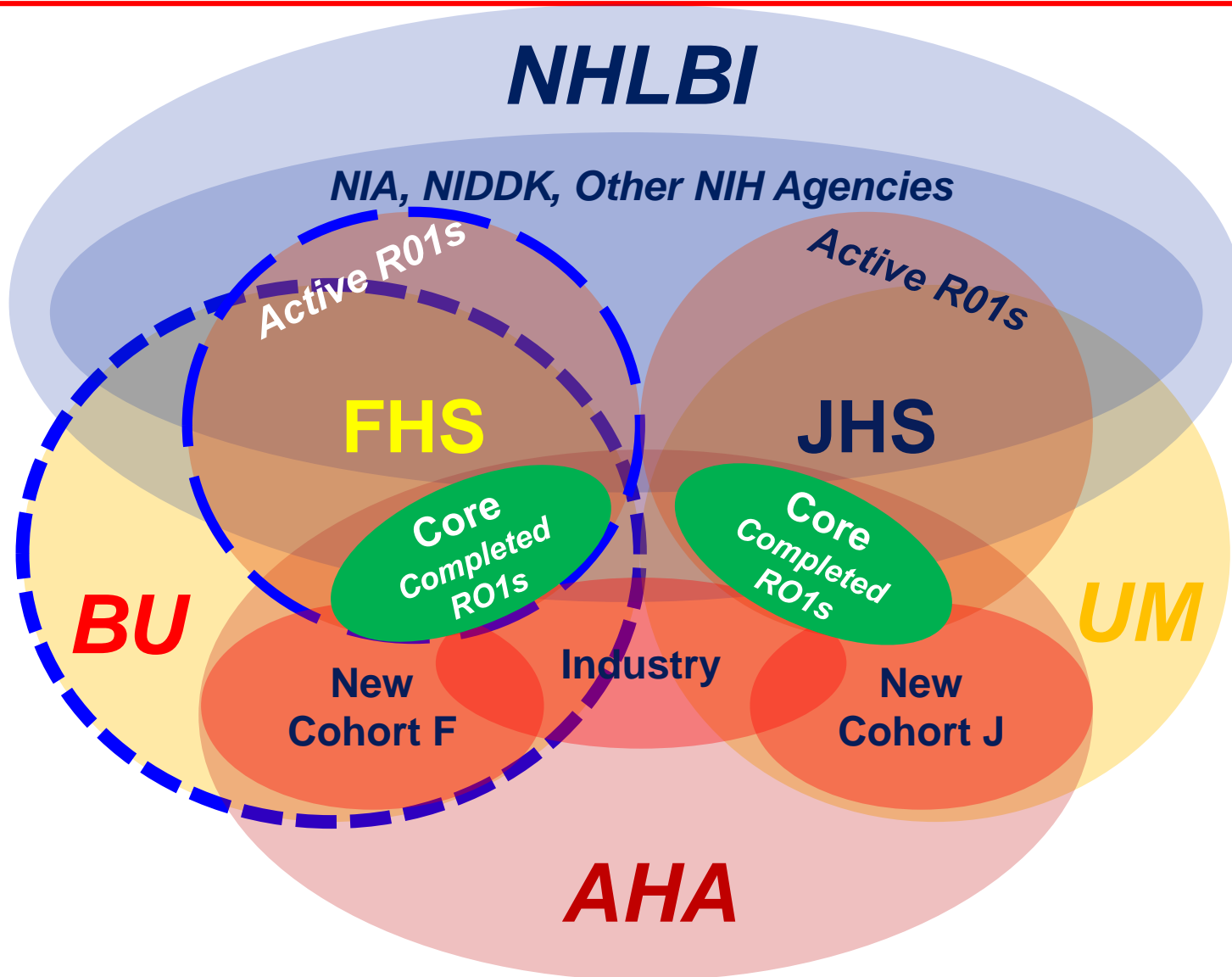
1.3 million biosamples ... Waiting to be used!!



FHS: roads less travelled!

- **Environmental epidemiology**
- **Social epidemiology**
- **Infectious disease epidemiology**
- **Epidemiology Methods development**

AHA CVGPS



Sponsored
by:

The Framingham Heart Study
Boston University School of Medicine



July 5 Sunday

7:00pm Dinner and Networking with Faculty

July 6 Monday

8:00am Registration and Breakfast

8:30 Working in Consortia: The CHARGE Experience

9:30 Lipids: Bench to Bedside to Population and Vice Versa

10:30 Break

11:00 Atrial Fibrillation: From Population Science to Zebra Fish

July 7 Tuesday

8:00am Registration and Breakfast

8:30 Heart Failure: What Mendelian Hypertrophic Disorders Tell Us About Common Forms of Ventricular Hypertrophy

9:30 Using Center for Medicare Services (CMS) Data for Outcomes and Drug Use Data for Pharmacogenetics

10:30 Break

11:00 Bioinformatic Approaches to Annotation of Genotype-Phenotype Associations

12:00pm Working Lunch: How to Write a Great Specific Aims Page

1:30 Computer Lab Session #2
FHS Genetic Data

4:30 Adjourn

July 8 Wednesday

8:00am Registration and Breakfast

8:30 Metabolomics: What Small Molecules Can Tell Us About Cardiometabolic Risk

9:30 Transcriptomics and miRNAs: Integrative Approaches To Omics Data

10:30 Break

11:00 iPS Cells: Humanity in a Petri-Dish to Extend GWAS Findings

12:00pm Working Lunch: Curriculum Vitae Boot Camp

1:30 Computer Lab Session #3
FHS Genomic Data

4:30 Adjourn

Boston, MA

More details at: bu.edu/cme

Positioning FHS for the future

- **Beyond etiological research: translation, implementation, dissemination**
- **Greater data access**
- **Extend cohorts across lifecourse & for multiple outcomes**
- **Novel technologies**
- **Integrate big data**
- **Knowledge integration into practice & policy**
- **Training the workforce for this millennium**
- **Optimize use of resources for best return on investments**

EDITORIAL

Editorials represent the opinions of the authors and JAMA and not those of the American Medical Association.

Time for a Creative Transformation of Epidemiology in the United States

Michael S. Lauer, MD

Cancer Epidemiology in the 21st Century

Transforming Epidemiology for 21st Century Medicine and Public Health

Muin J. Khoury^{1,5}, Tram Kim Lam¹, John P.A. Ioannidis⁶, Patricia Hartge², Margaret R. Spitz⁷, Julie E. Buring⁸,

Cancer Epidemiology, Biomarkers & Prevention

FHS changes in a Brave New World

- **Culture**

- Collaborative
- Transparent



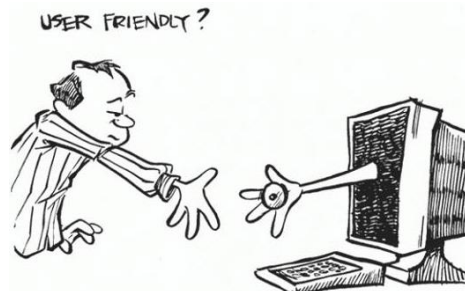
- **Science**

- Futuristic
- Transdisciplinary



- **Processes**

- Streamlined
- User-friendly



- **Organizational**

- National resource
- Self-sustaining in resource constrained environment



Collaborations: Challenges & Opportunities

- **Standardization of traits**
 - 'analysis-ready; distributed datasets
- **Joint leadership**
 - Framework and collaborations (lessons from genetics)
- **Funds to jump-start projects**
- **Protecting ESI across studies**

Collaborations: Some Questions?

- **Foster collaboration while maintaining uniqueness?**
- **Foster innovation while working towards harmonization?**
- **Synergies with precision medicine initiative?**
- **How to bridge gap between genetic & non-genetic collaborations?**