Background and History

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MESA Description

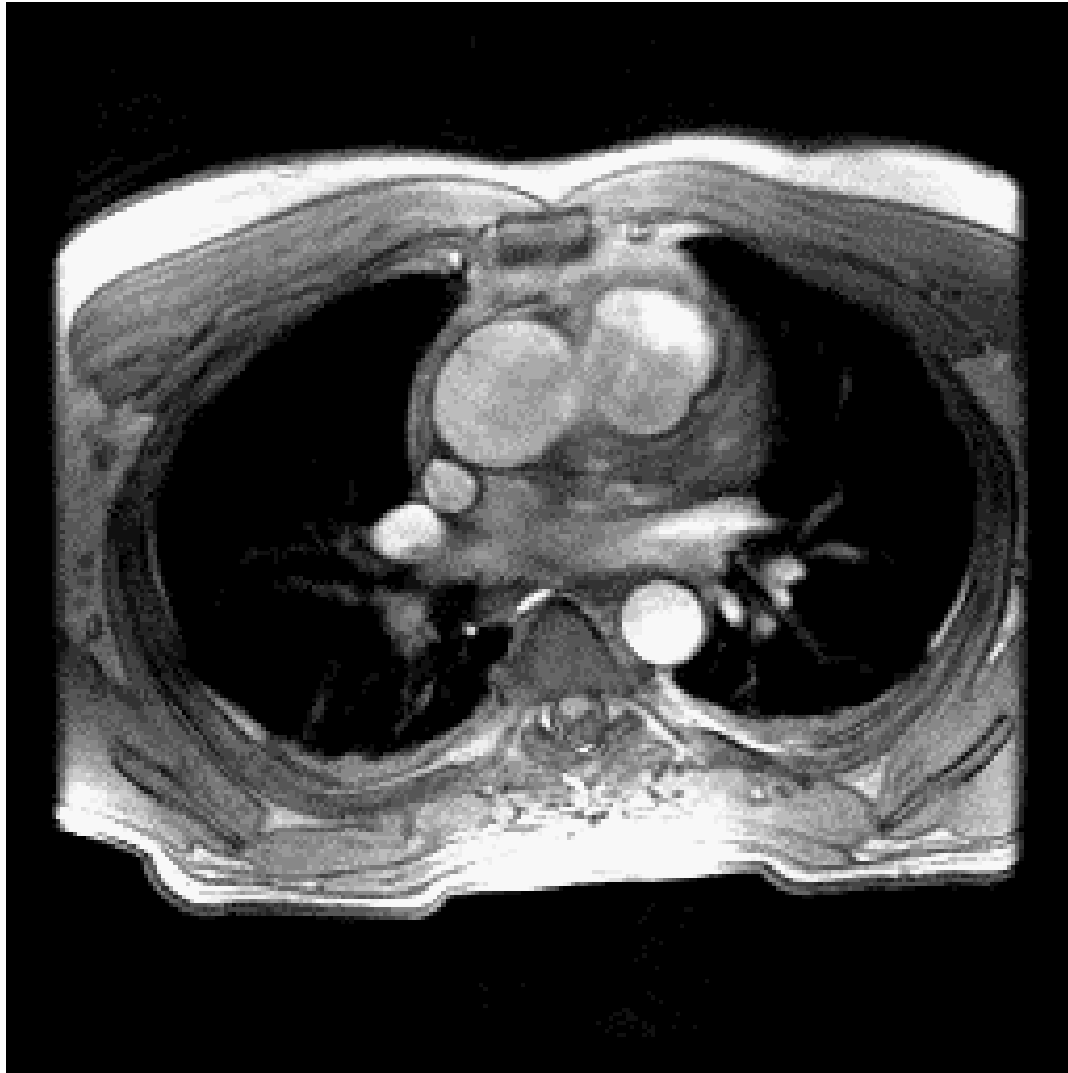The **M**ulti-**E**thnic **S**tudy of **A**therosclerosis (**MESA**) is a study of:

- **the characteristics of subclinical cardiovascular disease** (disease detected non-invasively before it has produced clinical signs and symptoms)
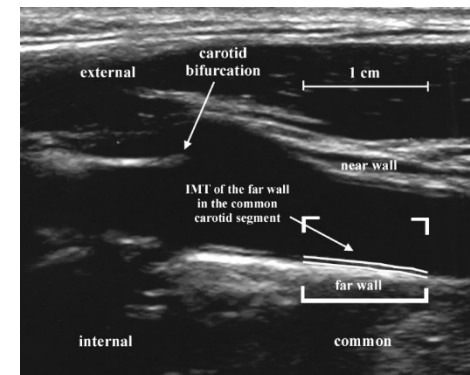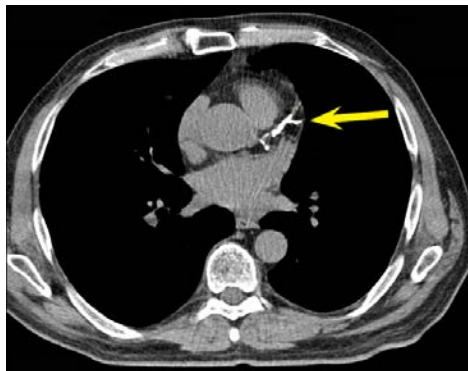
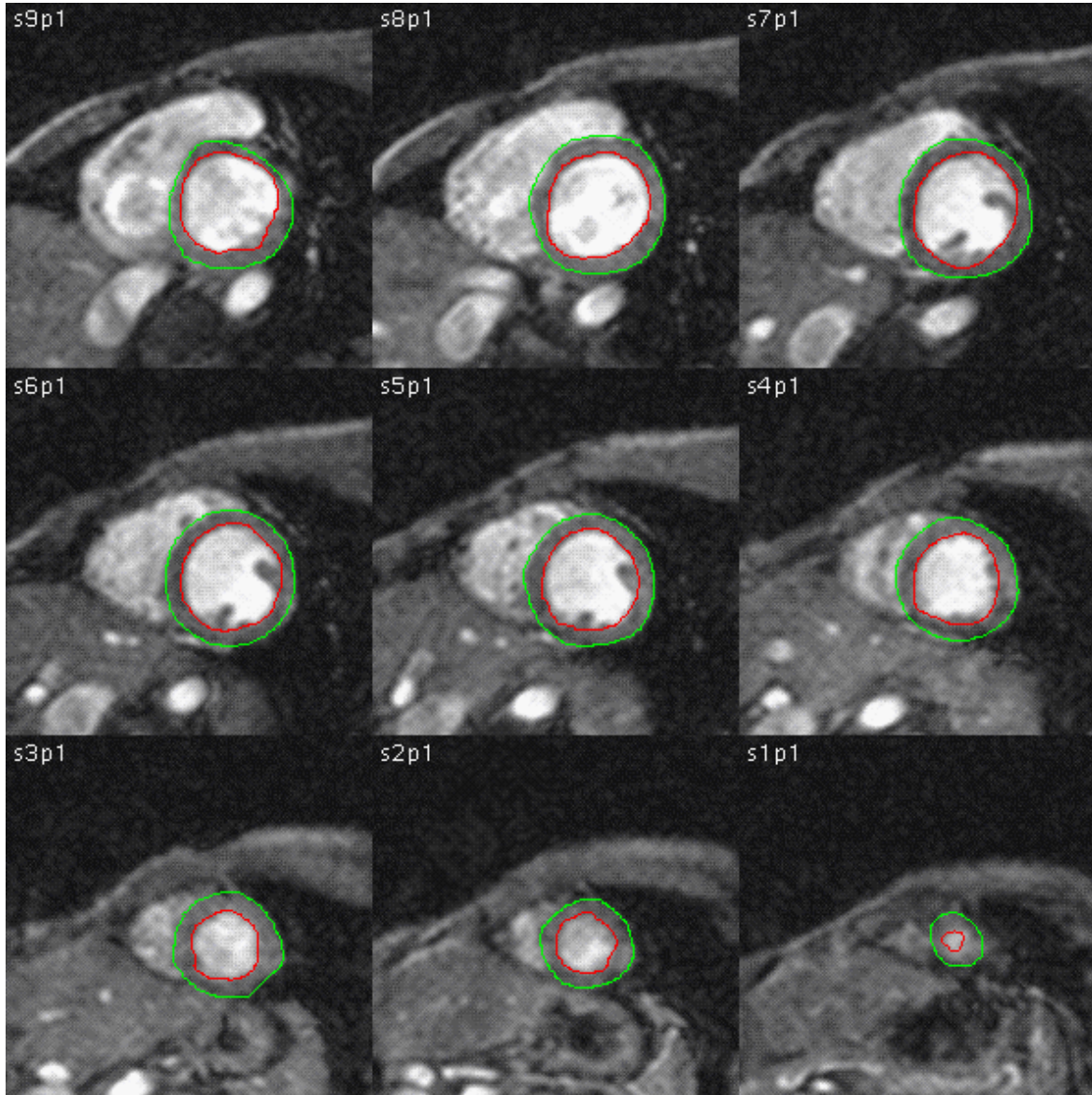# MRI Images

MRI Images

MRI Images

Brain MRI Images
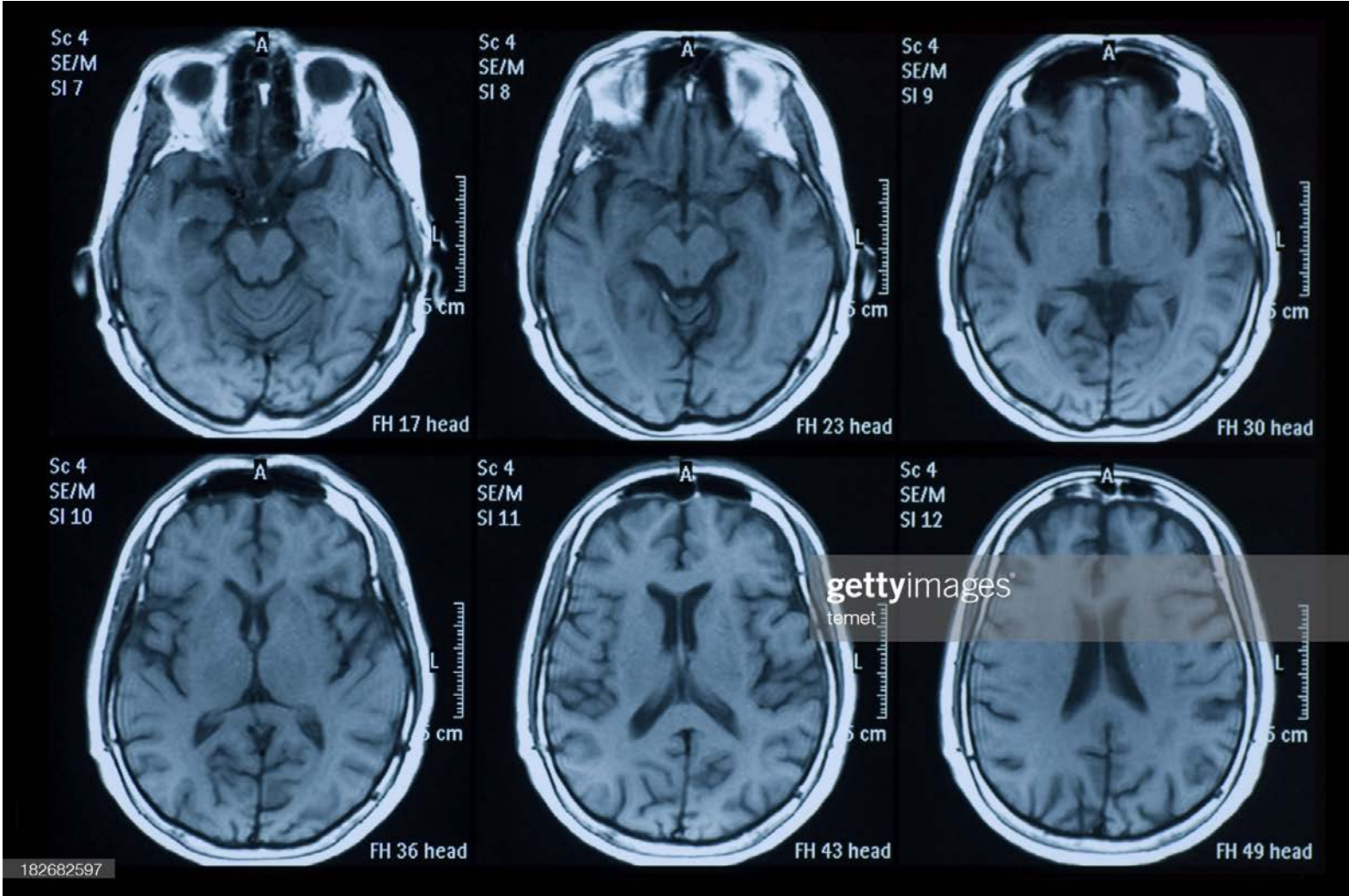
Lung CT Images
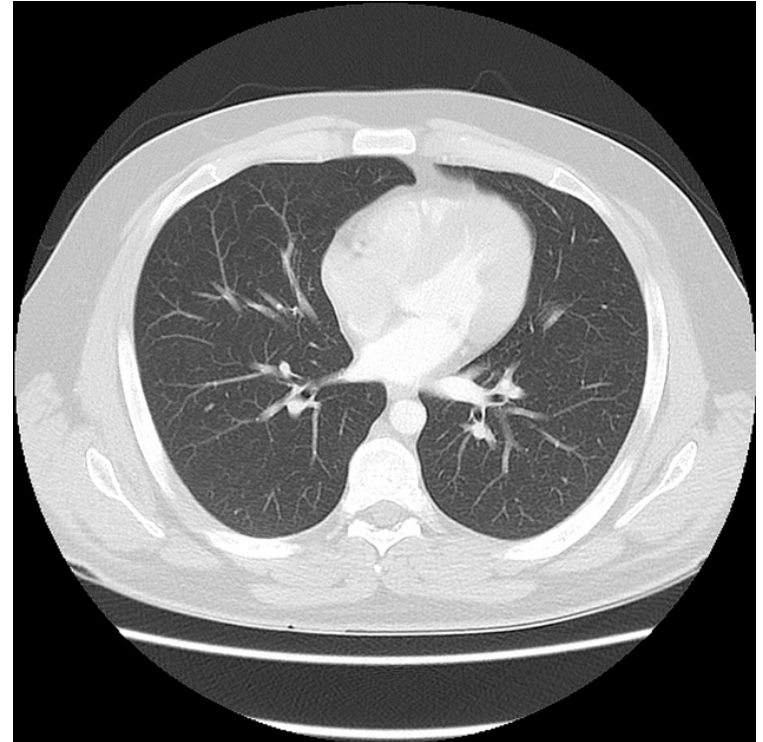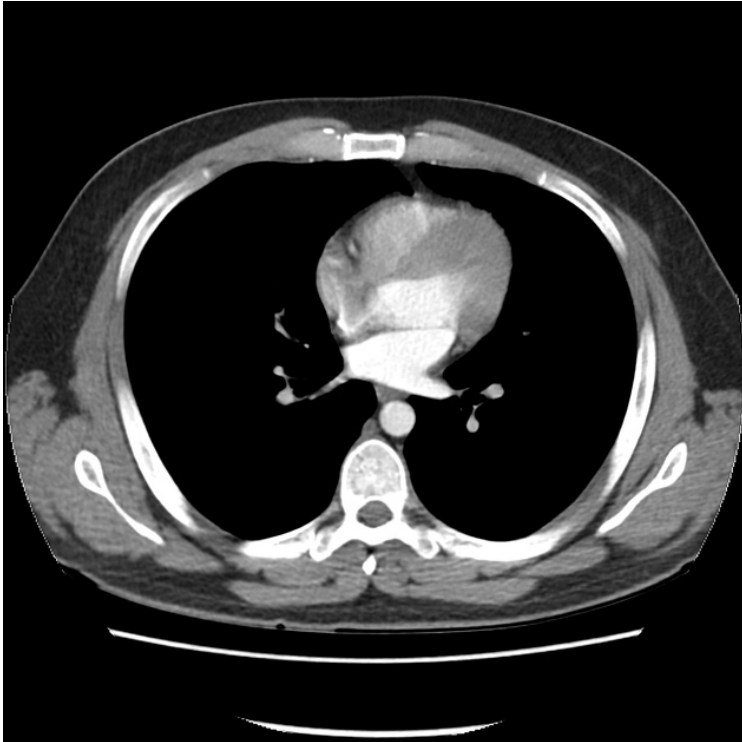
MESA Description

The **M**ulti-**E**thnic **S**tudy of **A**therosclerosis (**MESA**) is a study of:

- **the risk factors** that predict **progression to clinically overt cardiovascular disease**
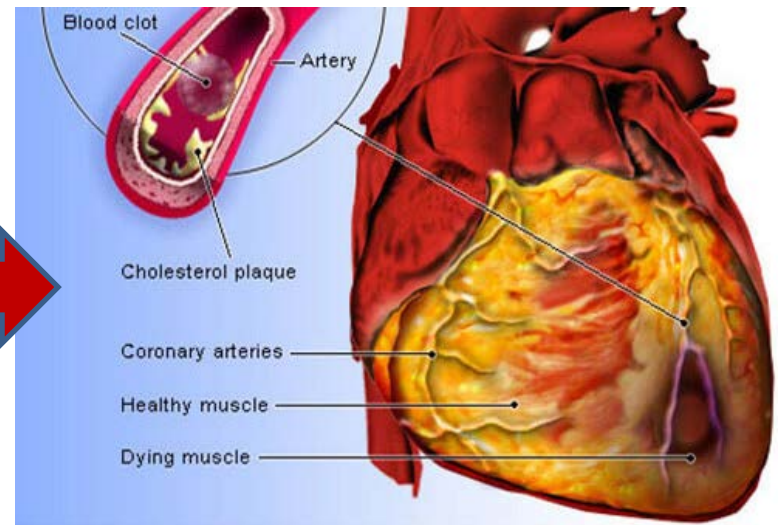
MESA Description

The **M**ulti-**E**thnic **S**tudy of **A**therosclerosis (**MESA**) is a study of:

- the risk factors that predict **progression of subclinical disease**
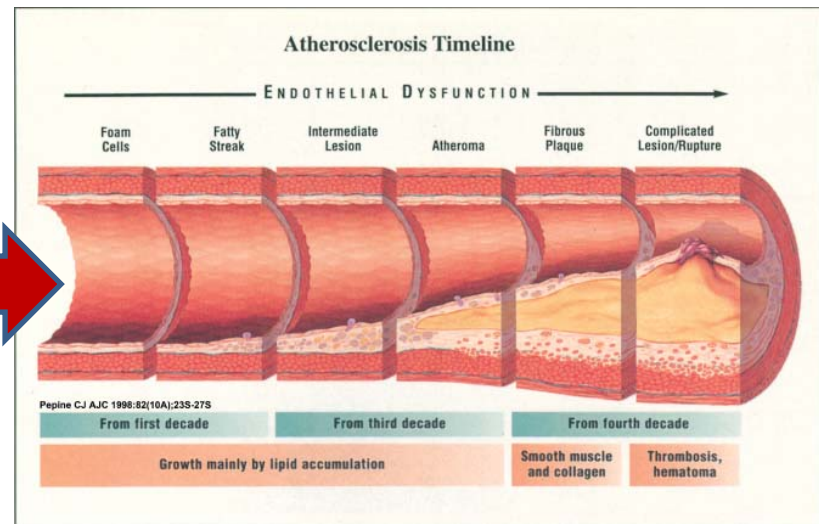
Cohort Description

- MESA researchers study a diverse, population-based sample of **6,814 asymptomatic men and women (53%) aged 45-84** from six field centers across the United States.
  - 38% percent are white
  - 28% percent African-American
  - 22% percent Hispanic
  - 12% percent Asian, predominantly of Chinese descent.
- In Clinic Visits:
  - Baseline Exam (Exam 1) July 2000-July 2002
  - Follow-up Exams 2 (2002 – 2004), 3 (2004-2005), and 4 (2005-2007)
  - Exam 5 (2010 – 2012)
  - Exam 6 (2016 – 2018)
- Participants are contacted every 9 to 12 months throughout the study to assess clinical morbidity and mortality.

Age distribution change since baseline
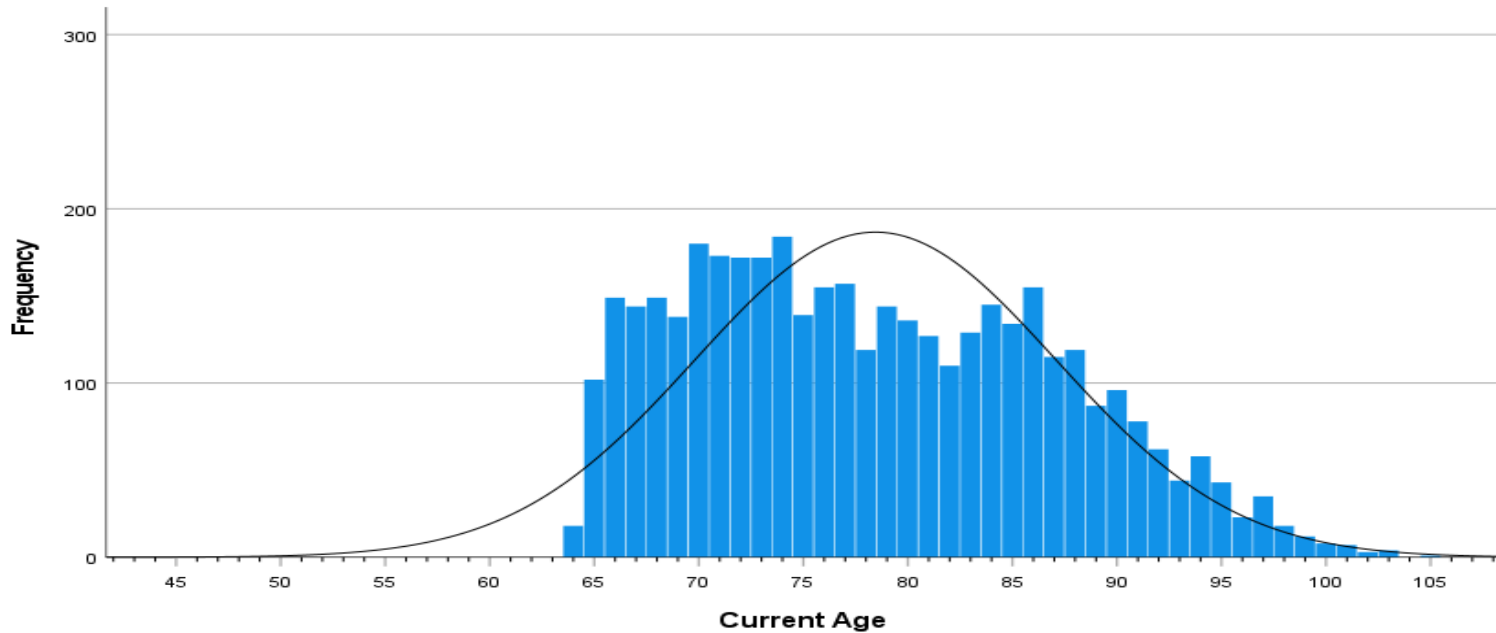
	Mean	SD	Min	25th %ile	Median	75th %ile	99%ile	Max
Current Age	78.5	8.64	64	**71**	**77**	**85**	98	105

- Age is an important retention factor
- E7 age range is expected to be 65-100 w/ median 77.

Distribution of participants by MESA Field Centers and Ethnicity

White 599
Hispanic 456

White 223
Black 382
Hispanic 494

White 131
Black 155
Hispanic 536
Chinese 497

White 557
Black 302
Chinese 301

White 524
Black 562

Total 6,814

White 574
Black 503
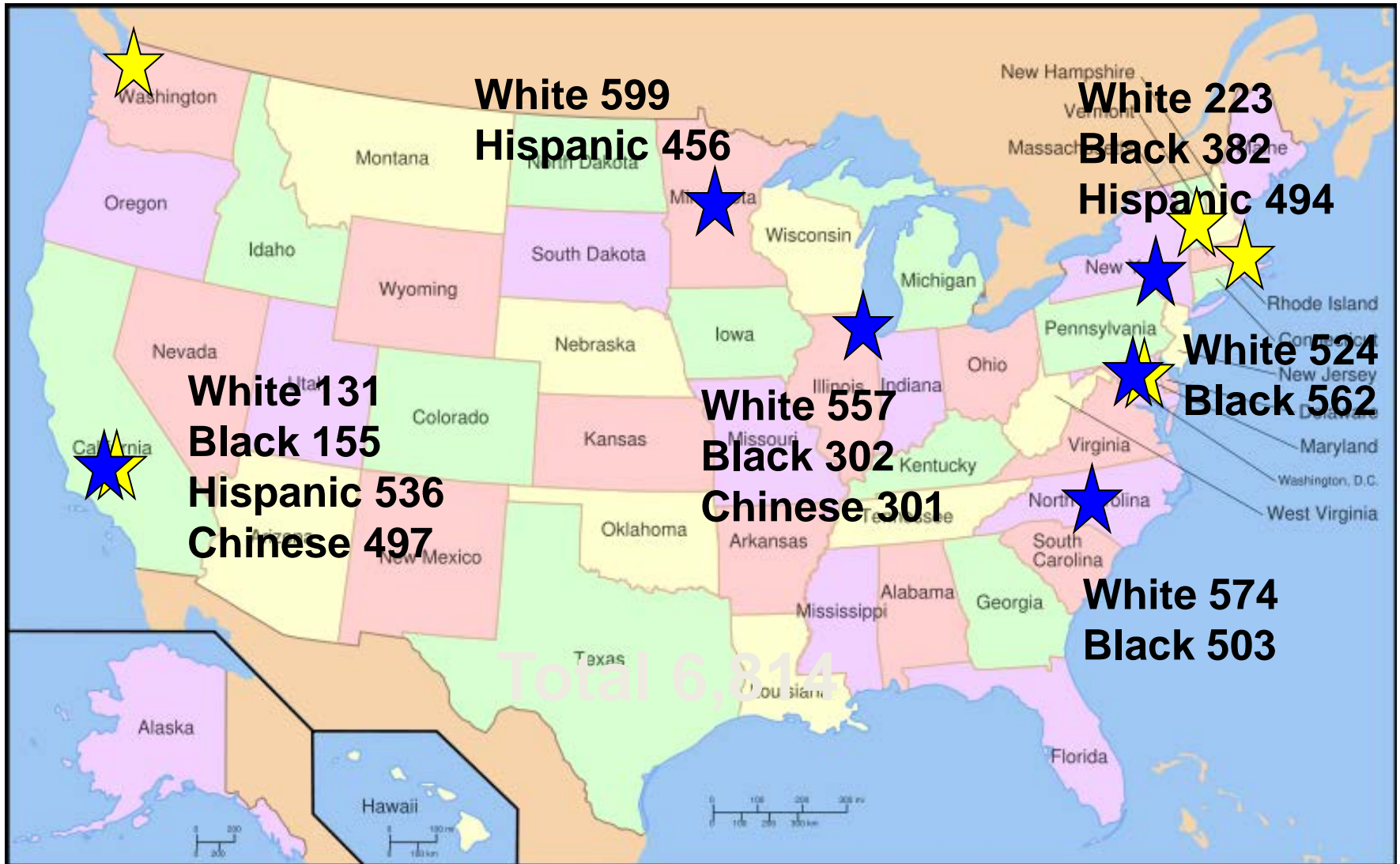
MESA Centers Important Ancillary Study Investigator Institutions

MESA Timeline

| 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |

Protocol Development, Training, Pilot

MESA Exam 1 | MESA Exam 2 | MESA Exam 3 | MESA Exam 4 | Data Analysis Publication | Data Analysis Publication, Training, Pilot Testing | MESA Exam 5 | Data Analysis, Publication | Protocol Development, Training | Exam 6 | Data Analysis, Publication

Follow-up 1 | Follow-up 3 | Follow-up 5 | Follow-up 7 | Follow-up 9 | Follow-up 11 | Follow-up 13 | Follow-up 15

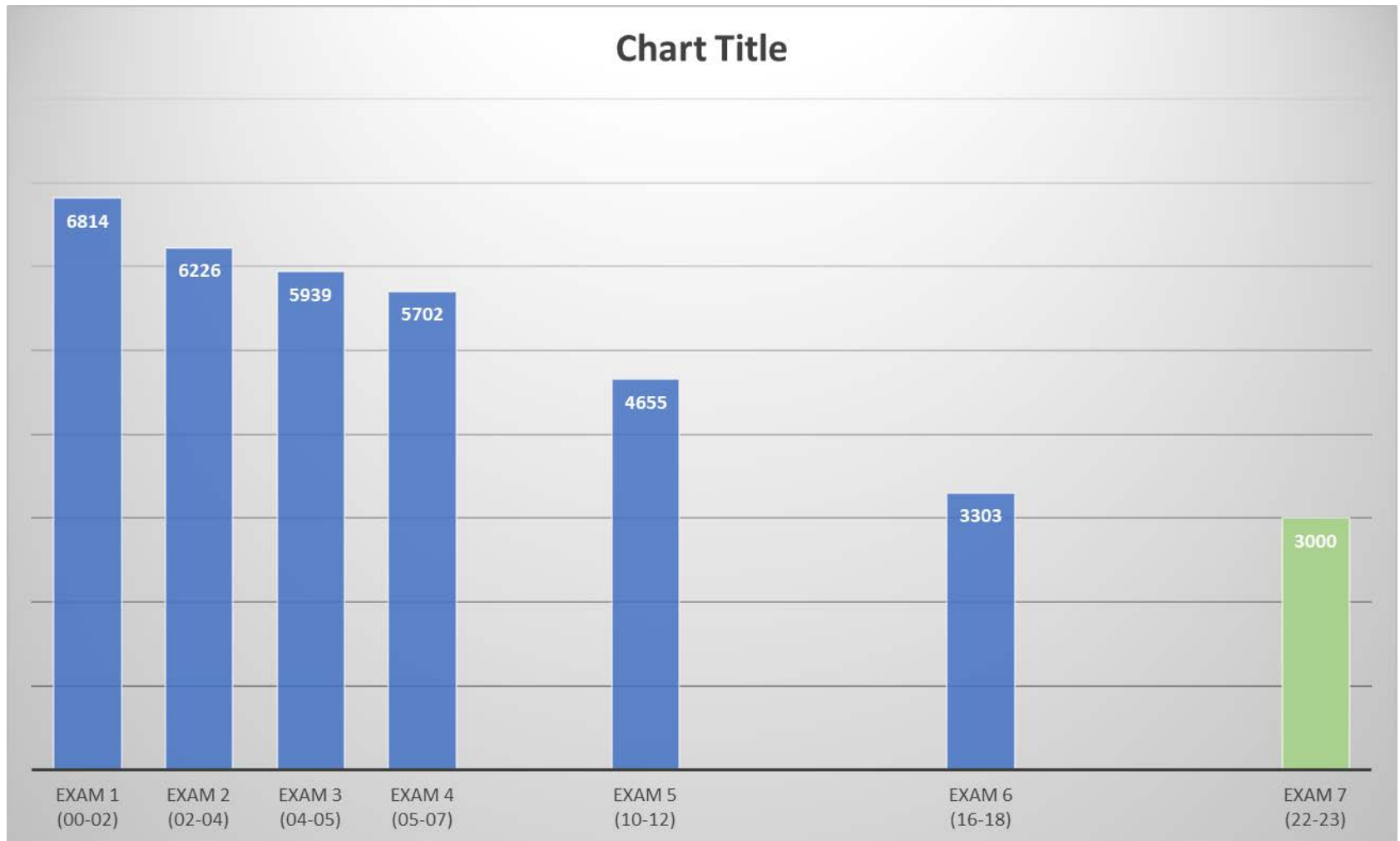Follow-up 2 | Follow-up 4 | Follow-up 6 | Follow-up 8 | Follow-up 10 | Follow-up 12 | Follow-up 14 | FU 16 | FU17 | FU18 | FU19 | FU20

E6 AS MESA INVITE
E6 AS Tissue Sodium
E6 AS UKNOW
E6 AS MESA Memory
E6 AS Atrial Fibrillation
E6 AS MESA Lung 3/Lung Non-Smokers
E6 AS MESA Heart Failure
E6 AS MESA PET
E6 AS Epigenetics of Obesity
E6 AS Epigenetics of Atherosclerosis
E6 AS Epigenetics of Cognitive Function

MESA Eye
Aortic Calcium/MESA CT
Residential History
Neighborhood
Carotid MRI
MRI Tagging
MESA Stress
MESA Family
MESA Lung
MESA Inflammation
RNA
MRI Coronary Wall

MESA Eye 2
Neighborhood 2
MESA Lung 2
MESA COPD
MESA Air
Arterial Elasticity
Epigenomics
MESA Sleep
MESA Kidney
MESA Air CCAR

MESA COPD 2
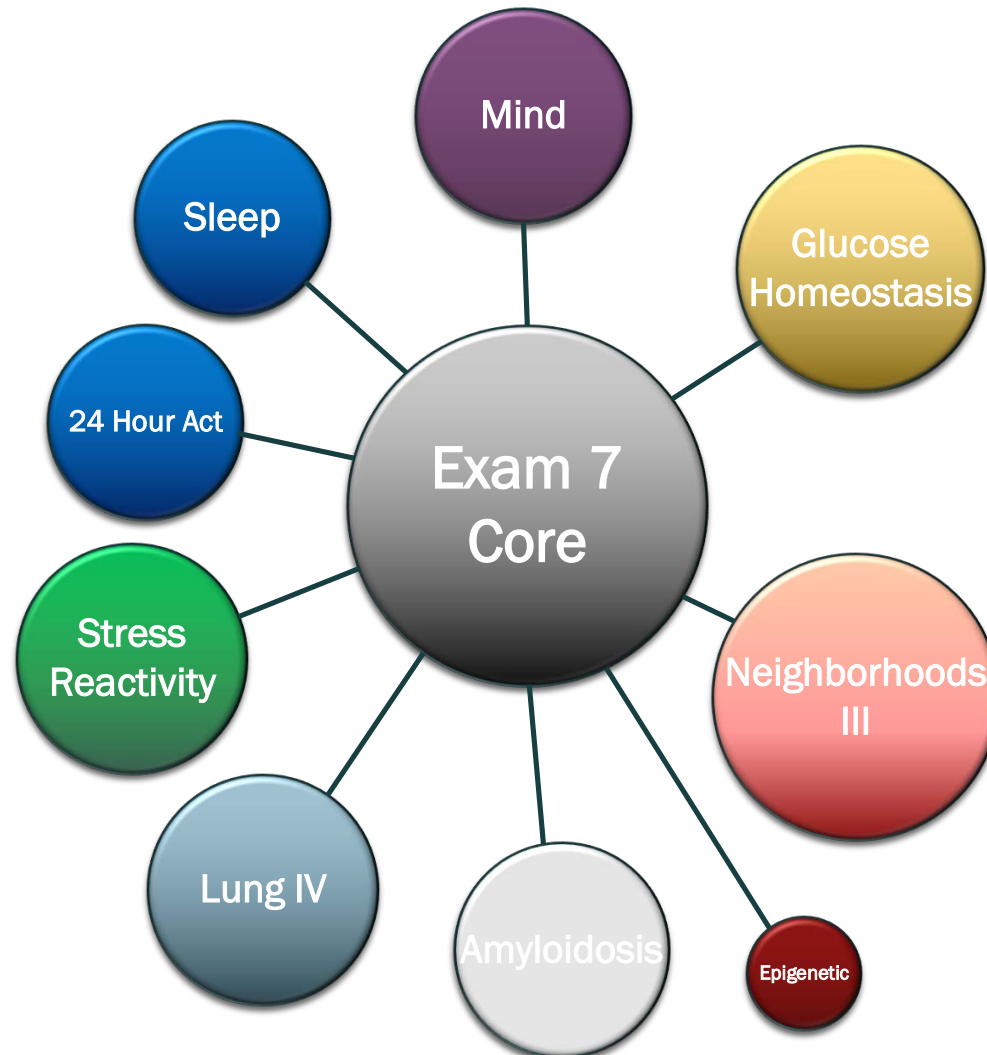
MESA Enrollment and Retention

Multi-Cohort Collaborative Efforts

- Cross-Cohort Collaboration

- COMBI-BIO

- Emerging Risk Factors Consortium

- Several genetics consortiums including CARe, CHARGE, TOPMed, …

- MESA has a long track record of collaborating with non-affiliated investigators.

Exam 7: Ancillary Studies

Biological Specimen repository

- Specimens Repository maintained at University of Vermont

- Specimens types include EDTA, SCAT, Serum, Citrate*
  - Exam 1: 6,600+ w/ ≥ 1.0 mL
  - Exam 2: 6,150+ w/ ≥ 1.0 mL
  - Exam 3: 5,800+ w/ ≥ 1.0 mL
  - Exam 4: 5,550+ w/ ≥ 1.0 mL
  - Exam 5: 4,500+ w/ ≥ 1.0 mL
  - Exam 6: 3,000+ w/ ≥ 1.0 mL

Image Repository

- Images
    - CT (Cardiac, Abdominal, Lung)
    - MRI (Cardiac, Carotid, Brain)
    - Ultrasound (Carotid, brachial FMD)
    - Echo
    - Retinal Photos
- Raw data/tracings
    - ECG
    - Sleep (polysomnography, actigraphy)
    - Pulsewave

Clinical Events

- Medical records reviewed/adjudicated

- NDI and CMS enhanced

- Events data released thru 2018 Calendar year
  - Average of 12.26 yrs of surveillance (median 16.7 yrs)
  - 533 Hard CHD Events (MI, rCA, CHD Death)
  - 1,148 All CVD Events (CHD + angina* + stroke + other CVD death)
  - 359 MI events
  - 415 HF events
  - 360 Stroke events

Genetics

- Candidate Gene Rounds 1 & 2 (2847; 3000 SNPs)
- CARe (Classic cohort; IBC 50K SNPs)
- SHARe (Classic+Air+Family; 1M SNPs)
- Candidate Gene Round 3 (Classic cohort)
- Exome Sequencing
- Exome Chip (250K SNPs)
- Metabochip (218K SNPs)
- TOPMed Whole Genome Sequencing (2016)

- Multi-Omics
(transcriptomics, methylomics, metabolomics, proteomics)

MESA Productivity

- 1,962 peer reviewed journal publications

- Over 300 ancillary studies
  - 7 New Ancillary Studies associated with Exam 7
  - Specimen repository (all exams) and scan images are frequently used for assessment of new/novel biomarkers.

MESA Investigators (February 2014

- MESA is bigger than its investigators
- 1 of 12 original MESA Steering Committee Members remains
- There have been 4 Project Officers