Retrospective Analysis of Early Mission Human Spaceflight Medical Data

Katherine Wilson

Agnes Scott College, Emory University Rollins School of Public Health

National Space Biomedical Research Institute Summer Apprenticeship Program

Lifetime Surveillance of Astronaut Health

Mary Van Baalen

Introduction

- Research and career interests
  - Epidemiology, data science
- Why NASA?
  - Unique population, exposures, and data use
  - Human spaceflight as an inspiration for innovative public health initiatives on Earth
  - Combine interests in epidemiology and science fiction

LSAH and LSAH Repository

- LSAH
  - conducts occupational surveillance and disease prevention
- Repository
  - compiles and releases medical data for consented research use
- Data Limitations
  - Collection objective – operations
  - Availability

Why Early Missions?

Increase sample size for human spaceflight exposures and outcomes

- Exercise
- Injury
- Fatigue

- Diet
- Fluid Shift
- Motion Sickness
- Deconditioning
- Bone Demineralization
- Impaired Cell-mediated Immunity

- Cardiovascular disease
- Cancer
- Mortality due to accidents
- Routine exercise

Training | **24-hour to 4-week Missions** | **Life Course**

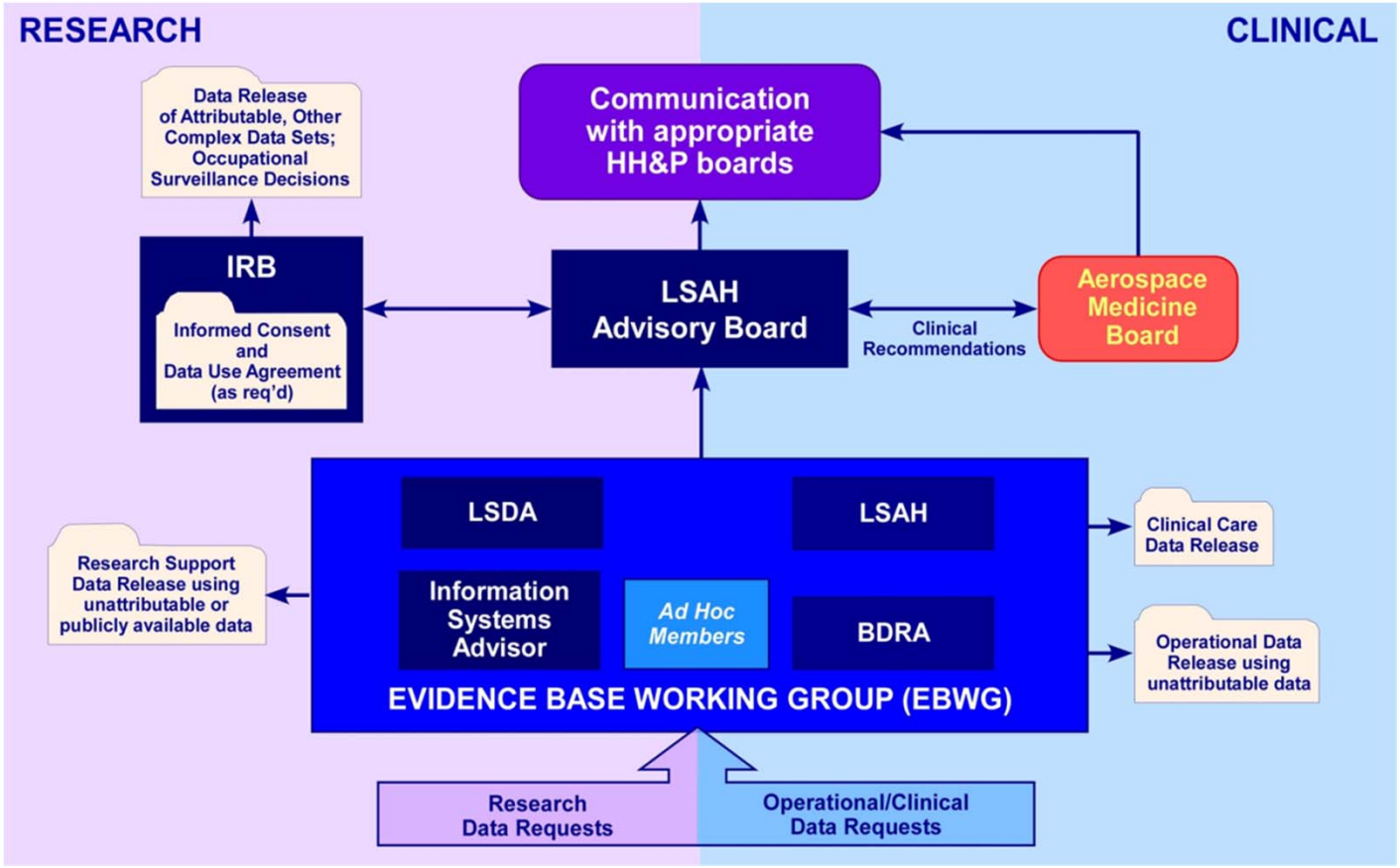
Sleep Debt and Psychosocial Factors

Why Early Missions?

- Unique exposures – lunar EVAs
- Complete exposure data for astronauts who flew later missions
- Historical Significance

Project

Consented release of early mission data to National Space Biomedical Research Institute (NSBRI) and other researchers



Objectives

- Inventory data and summarize available data types
- Evaluate early mission NSBRI physiology data set and conduct preliminary analysis

Methods

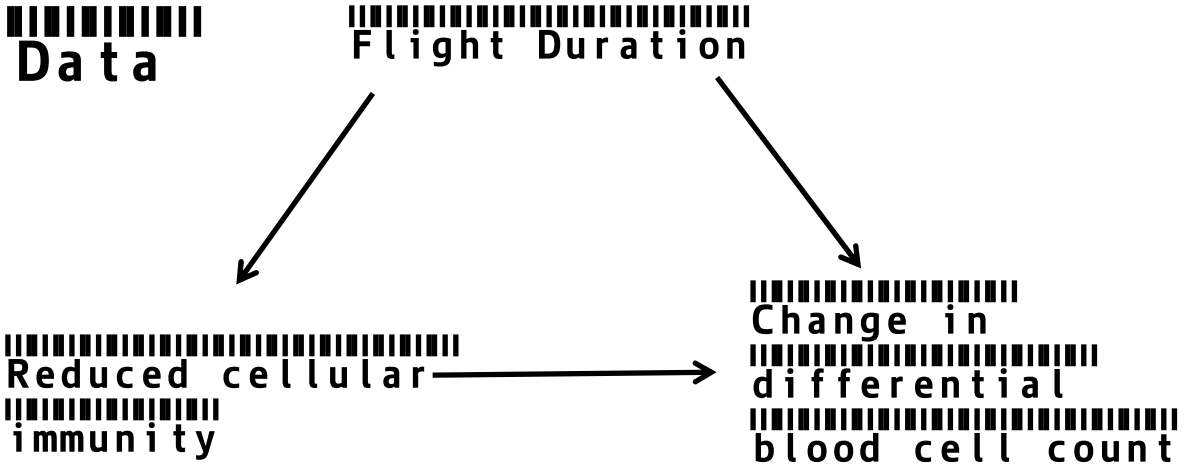
- Paper and electronic flight medical records
- Data inventory and analysis in Excel and SAS

Early Mission Astronaut Population

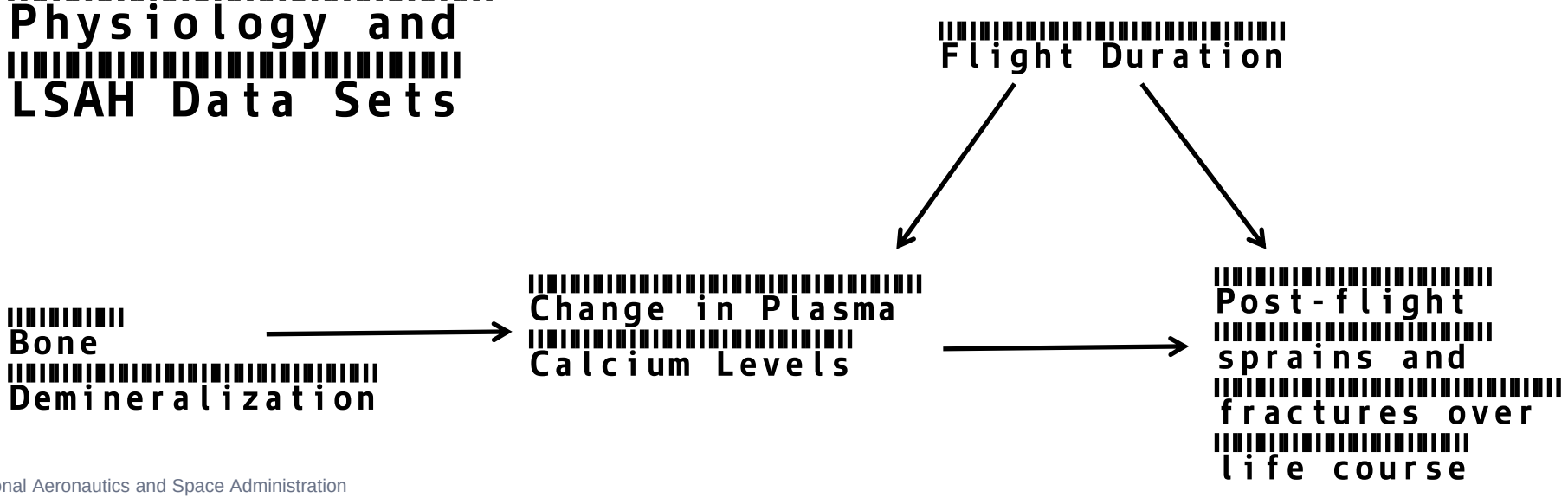
- n=34
- 28 flights
- 41 EVAs
- 526 person-days of spaceflight

Example Analyses

Physiology Data Set



Physiology and LSAH Data Sets



Results

- Early mission record and variable inventory
- Data set assembly procedure
- Validated Mercury and Gemini NSBRI physiology data set for research analysis
  - Preliminary analysis

Skills Acquired

- Introduction to occupational health epidemiology with human spaceflight exposures
- Medical records management
- New SAS skills
- CITI Human Subjects Research Basic Course

Discussion

- Early mission record availability will facilitate
  - Spaceflight exposure risk and outcome research
  - Occupational surveillance
  - Preservation of spaceflight history

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MERCURY 4
GRISSOM
LIBERTY BELL 7
MERCURY 6
Friendship 7
GLENN
MERCURY 7
AURORA 7
CARPENTER
MERCURY 8
SCHIRRA
MERCURY 9
FAITH 7
COOPER
GRISSOM - YOUNG
GT-3
MOLLY BROWN
GEMINI 4
FIRST SPACEWALK
McDIVITT
WHITE
GEMINI 5
8 Days or Bust
COOPER
CONRAD
BORMAN - LOVELL
VII
GTA-6
SCHIRRA
STAFFORD
ARMSTRONG
SCOTT
IX
YOUNG
X
COLLINS
CONRAD GORDON
XII
LOVELL
ALDRIN
GRISSOM
CHAFFEE
WHITE
APOLLO 1
SCHIRRA · EISELE · CUNNINGHAM
VII
BORMAN LOVELL ANDERS
McDIVITT SCOTT SCHWEICKART
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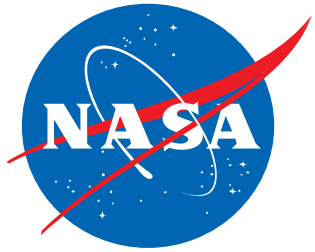
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