Microgravity as a Biomedical Test Bed for Candidate Therapeutics

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Exploit Physiological Caused by Space Flight

- Immune Suppression
- Muscle Atrophy
- Bone Loss
- Cardiovascular Deconditining
- Vestibular Imbalance
- Anemia
- Altered Pharmacokinetics

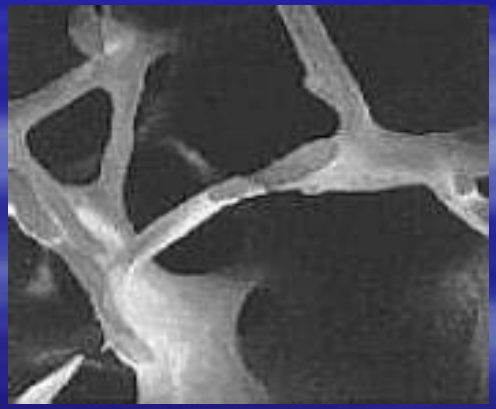
- Many Diseases Related to Aging are Caused by Space Flight
- Accelerated, Controlled

Previous and Future Experiments

- Immune Suppression
  - STS-60: IL-2 (Chiron)
  - STS-63: IL-2 (Chiron)
- Osteoporosis
  - STS-77: IGF-I (Chiron)
  - STS-108: Osteoprotegerin (Amgen)
  - STS-118: Osteoporosis Therapy (Startup Biotech)
- Sarcopenia/Muscle Atrophy
  - STS-121: Sarcopenia Therapy (Biotech Company)

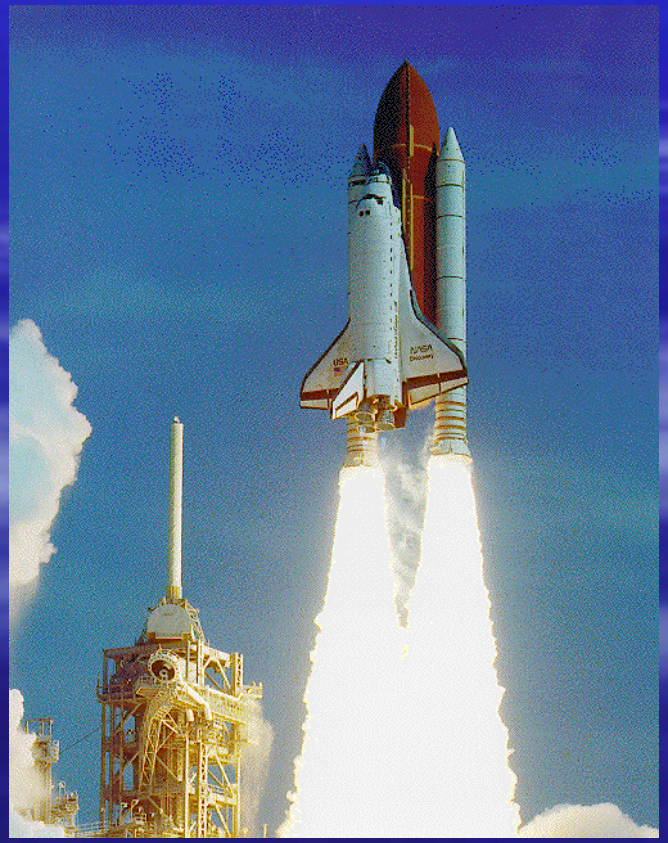
Spaceflight Accelerates the Model

- Type I Osteoporosis
  - Bone mass ⇓ 20%
  - 3-4% per yr. 5-7 yrs.
- Type II Osteoporosis
  - ~1% per year
- Spaceflight
  - 0.5-2% per MONTH



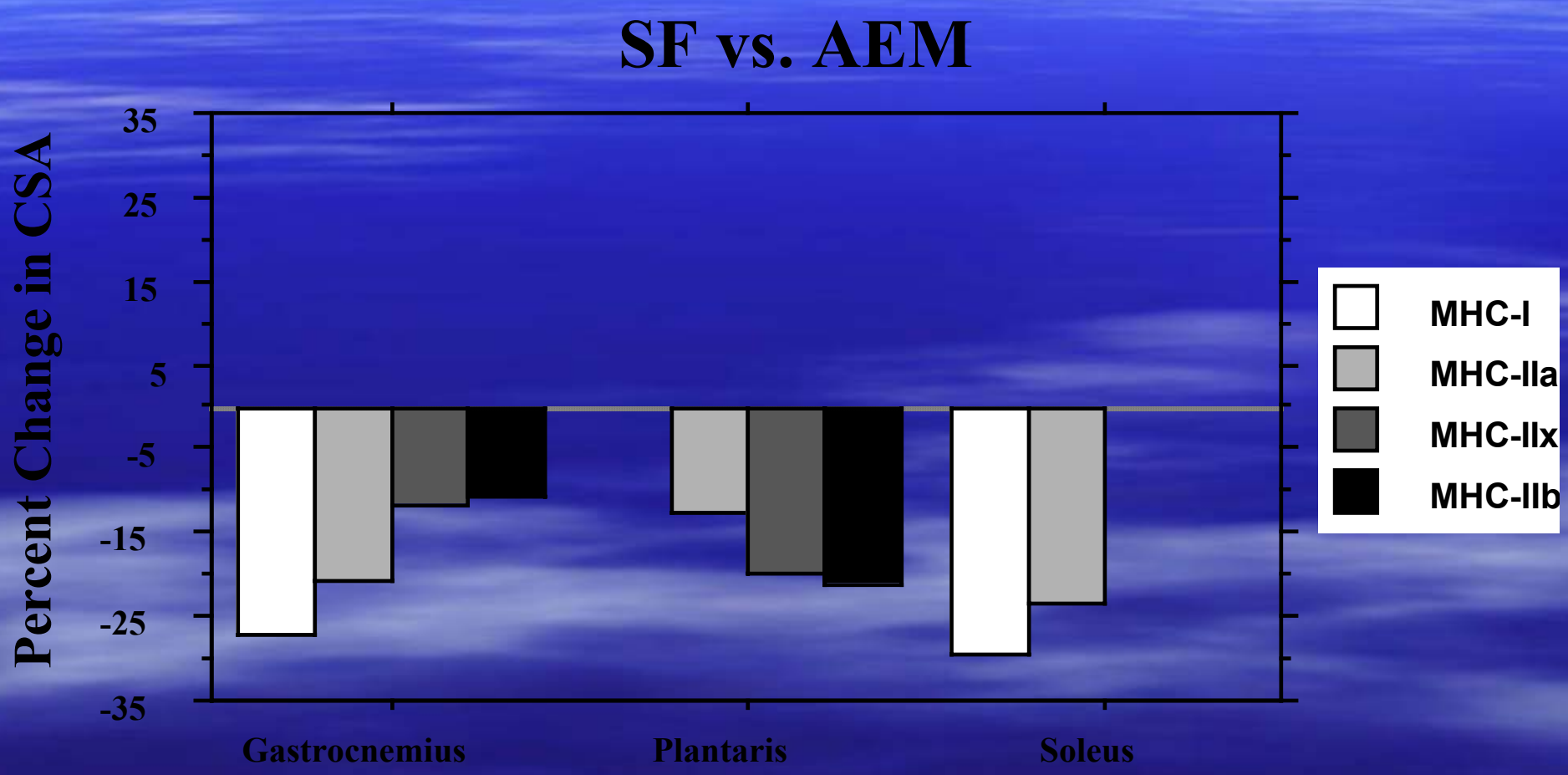
STS-108 CBTM Experimental Design

- 10-week-old female C57BL/6J (n=12/grp.)
  - Spaceflight
    - OPG (20mg/kg- single SC injection 24-hours pre-launch)
    - Placebo
  - AEM (flt. hardware) Ground Controls
    - OPG (SC 20mg/kg)
    - Placebo
  - Vivarium Caged Ground Controls
    - OPG (SC 20mg/kg)
    - Placebo
  - Baseline- no treatment, pre-flight controls



Bone Data Slides Removed

Muscle Atrophy



The Benefits: Full Service Access to Space Experimentation

- Validation of Therapeutic in Extreme Environment
  - Begin with Ground Based Models
- Engineering Perspective on Data Analysis
- Commercially Focused
- Scientific Firsts (Publications)
  - Novel Model Development (Countermeasures for Astronauts)
  - Exploiting Transgenic Model
  - First Animals to Space Station
- Public Relations
  - Press Releases, Guests, Launch Passes, Easy Story
- NASA/BioServe Leveraging of $$/Expertise

How? Who? and How Much?

- Contact BioServe Space Technologies
  - Louis Stodieck: 303-492-4010
  - Stefanie Countryman: 303-735-5308
  - Ted Bateman: 720-810-3626
- What Kind of Companies?
  - Established Biotech and Pharmaceutical
  - Startups: Venture Capital and Equity Leveraging
- Cost?
  - Variable, Negotiable, and Reasonable
  - Leveraged with NASA Resources

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