



# To Mars and Beyond: How Will We Preserve the Musculoskeletal System in Long-term Space Flights?

National Aeronautics and  
Space Administration



## Concerns

- Bone fracture
- Intervertebral disc damage
- Renal stone formation

## Challenges

- Expand knowledge beyond measuring for bone mineral density
- Determine critical factors
  - Exercise
  - Nutrition
  - Radiation
- Develop probabilistic fracture risk assessments
- Expand understanding of fracture healing in microgravity

## Research Venues

- Industry
- ISS National Laboratory
- NASA
- National Institutes of Health

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