

Physical Health in Space



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Sources of Danger

- Weightlessness
- Radiation
- Microbes & viruses



Weightlessness

Absence of the sensation of weight



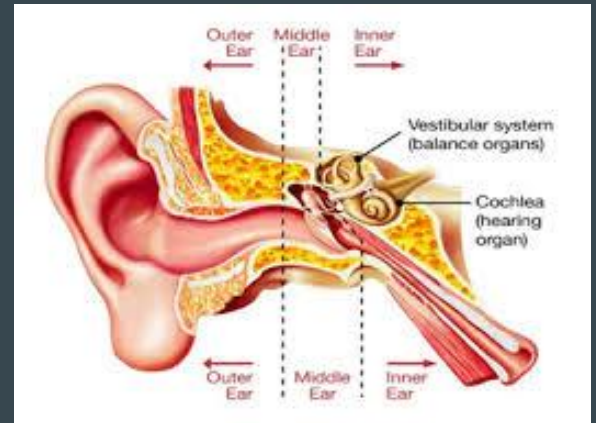
<https://www.airspacemag.com/ask-astronaut/how-does-nasa-simulate-weightlessness-180958426/>



<http://faculty.virginia.edu/skrutskie/ASTR1210/notes/weight.html>

Space Adaptation Syndrome (SAS)

- **Symptoms**
 - Nausea
 - Vomiting
 - Headaches
 - Vertigo
 - Disorientation
- **Causes**
 - Impaired vestibular system
 - Impaired proprioceptive system
- **Treatment**
 - Antiemetics
 - Directional Cues



https://www.eyearandear.org.au/page/Patients/Patient_information/Balance_Disorders/How_does_the_balance_system_work/

Bone & Muscle Loss

Loss of Bone Mass

- 1-2% loss per month
- Decreased osteoblast activity (forms new bone tissue)
- Increased risk of fracture
- Prevention: Exercise

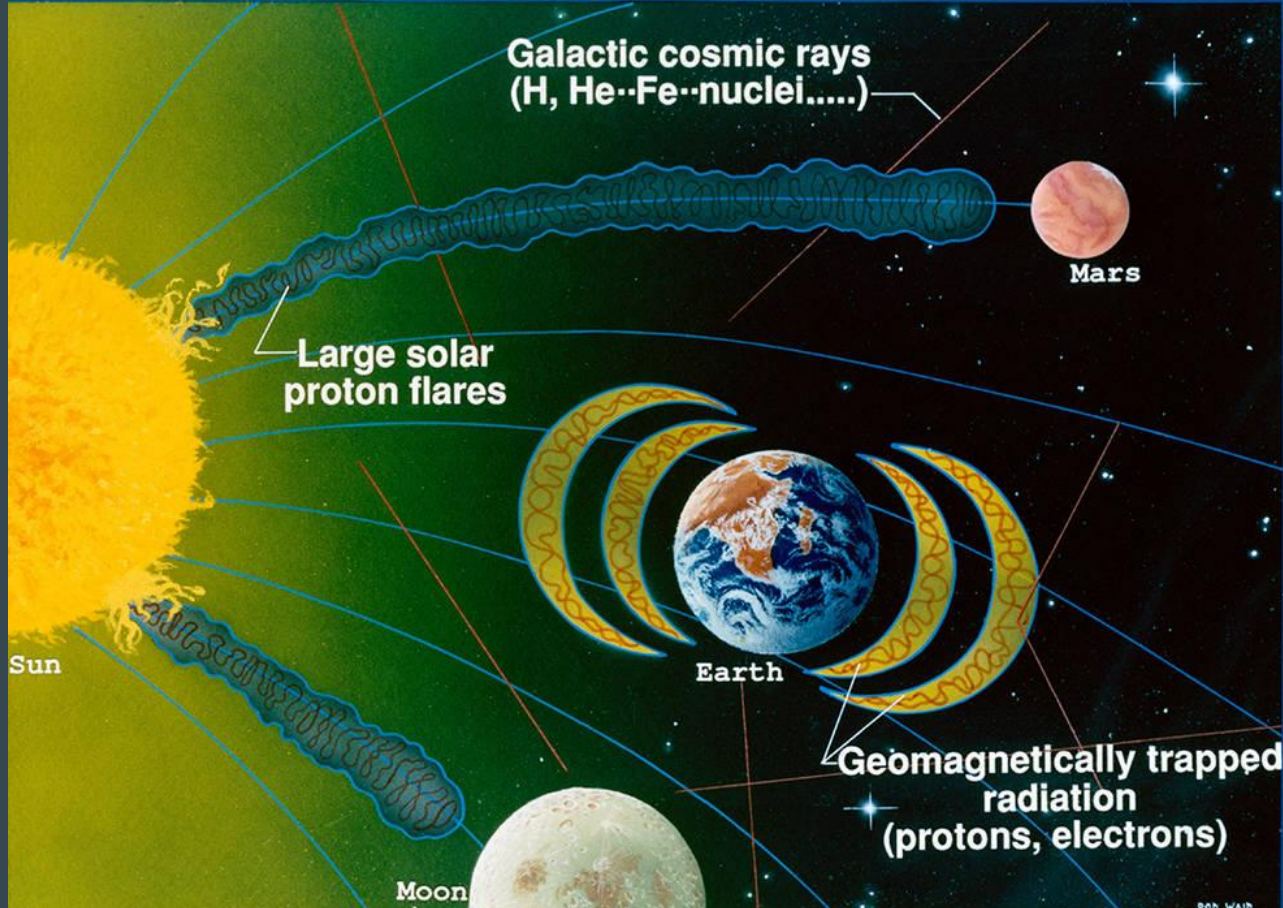
Loss of Muscle Mass

- 20% loss over 5-11 days
- Atrophy (muscular degeneration due to lack of use)
- Weakness
- Prevention: Exercise



Radiation

Types of Radiation



Acute Effects

Felt immediately & caused by a large dose in short amount of time

- Diarrhea
- Nausea
- Vomiting
- Central nervous system damage
- Death

Chronic Effects

Felt later & caused by a small dose over large amount of time

- Cataracts
- Sterility
- Increased risk of cancer, cardiovascular disease, and age-associated diseases
- Decreased neurogenesis



<https://www.nasa.gov/twins-study>



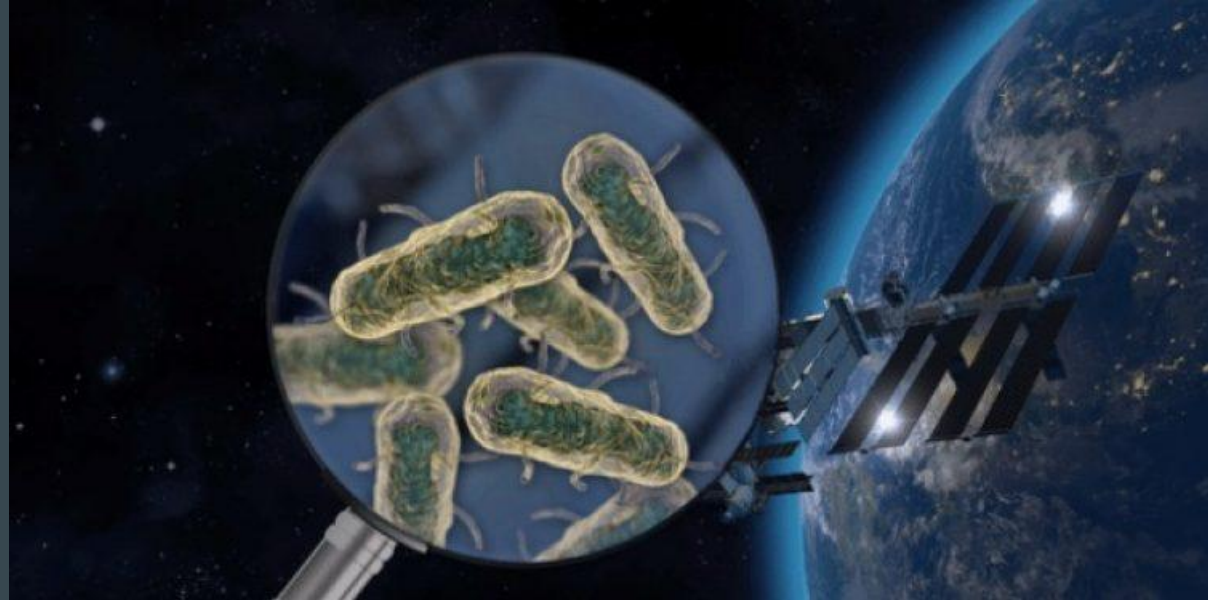
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NASA's Twins Study

Microbes & Viruses

Why is it a threat?

- Increased virulence
 - Altered regulation of ycdL
- Increased resistance to antibiotics and vaccines



<https://thebravehindu.com/international-space-station-identified-microbes-space/>

Effects

- Repressed immune response
- Close contact between crew members
- Increased susceptibility to bacterial and viral infections





The Future



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