**Beat: News**

# The main effects of a long stay in space.

**How does the body of astronauts change?**

Bologna Motorvalley Italy, 23.03.2025, 15:12 Time

**USPA NEWS -** In 2024, NASA astronauts Sunita "Suni" Williams and Barry "Butch" Wilmore experienced an extraordinary adventure in space, remaining stranded for a much longer period than expected. Their initial mission aboard the Boeing Starliner spacecraft was supposed to last only eight days. However, technical problems with the propulsion system and other components of the spacecraft made their return to Earth impossible.
As a result, Williams and Wilmore remained on the International Space Station (ISS) for about nine months, continuing to conduct scientific research and station maintenance activities while a solution was sought. Finally, in March 2025, they returned safely to Earth thanks to the SpaceX Crew Dragon spacecraft.

Main effects of the prolonged stay in space
Space is an extremely hostile environment for the human body, and living in microgravity for extended periods can cause numerous physical and psychological effects, which are often the focus of in-depth scientific research.
1. Muscle atrophy and bone density loss
Microgravity causes muscle weakening (especially in the legs and back) and a significant loss of bone density, increasing the risk of fractures.
Astronauts follow intensive physical exercise regimes to mitigate these effects.
2. Redistribution of bodily fluids
In microgravity, fluids shift toward the upper part of the body, causing facial swelling, vision changes, and intracranial pressure.
3. Immune system weakening
The space environment can reduce the effectiveness of the immune system, increasing vulnerability to infections and allergies.

4. Cardiovascular changes
The heart works less intensively in space, leading to a reduction in cardiac mass.
Upon returning to Earth, astronauts may suffer from orthostatic hypotension, or difficulty regulating blood pressure while standing.
5. Neurological problems
Microgravity can affect the central nervous system, causing spatial disorientation, balance issues, and sensory changes such as loss of taste or smell.

6. Exposure to cosmic radiation
Without the protection of Earth's atmosphere, astronauts are exposed to high levels of radiation, increasing the risk of cancer and neurodegenerative diseases.
7. Psychological effects
Isolation, confined routines, and the distance from Earth can provoke stress, anxiety, depression, and disruptions to the circadian rhythm.

Specific psychological aspects
1. Stress and anxiety Isolation and heightened responsibility in an extreme environment generate high levels of stress. Intensive training and simulations help prepare astronauts psychologically.
2. Isolation and loneliness Limited communication and response delays can accentuate feelings of loneliness. Continuous psychological support programs are essential.
3. Circadian rhythm disruption The lack of a natural day-night cycle (the ISS experiences 16 sunrises per day) can lead to insomnia. Special lighting and strict schedules are used to simulate the Earthly rhythm.

4. Relational conflicts Forced cohabitation in confined spaces can cause irritation and relational difficulties. Space agencies carefully select compatible crews to minimize such issues.
5. Monotony and depression The absence of natural stimuli and sensory variety can lead to irritability and apathy. Cultural, recreational, and physical activities are included in mission programs.
6. Sensory disconnection The lack of natural sounds and scenarios can induce a sense of "detachment." Immersive technologies like virtual reality offer relief and moments of relaxation.

Mitigation strategies
Space agencies adopt advanced measures to reduce the negative effects of microgravity and isolation, including:
• Continuous psychological support: Regular consultations with psychologists and contact with family members.
• Immersive technologies: Virtual reality to simulate terrestrial environments.
• Pre-mission training: Simulations in extreme environments to prepare for psychological challenges.

**Article online:**
https://www.uspa24.com/bericht-25472/the-main-effects-of-a-long-stay-in-space.html

**Editorial office and responsibility:**
V.i.S.d.P. & Sect. 6 MDStV (German Interstate Media Services Agreement): Roberto Magni e Daniela Comi By ReD Magazine

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