

Microgravity

May 4, 2025 • vajiramandravi.com



Microgravity Latest News

Researchers at the Indian Institute of Space Science and Technology (IIST) have developed a 3D computational model that shows microgravity consistently increases human core body temperature, which is crucial for long-duration space missions.

What is Microgravity?

- **Microgravity** is a condition of **apparent weightlessness** experienced in space when objects are in **free-fall orbit around Earth**.
- **Microgravity** does not mean the absence of gravity. At orbital altitudes (~250 miles above Earth), **gravity is ~89% as strong** as on Earth.
- Objects **appear to float** because they are in **continuous free fall around the Earth**, a state first explained by **Isaac Newton's orbiting cannonball thought experiment**.
- **Weightlessness ≠ no gravity**; rather, it results from **free-fall motion**, where objects, spacecraft, and astronauts all fall simultaneously.

- In such an environment, **physiological changes** occur, affecting **bones, muscles, blood circulation, metabolism, and thermoregulation**.
- **Thermoregulation** is the process by which the **human body maintains a stable core temperature**. It is crucial during **long-duration space travel**, where the **microgravity environment** significantly alters normal physiological responses.

Thermoregulation Model

- **IIST's Thermoregulation Model:** Developed a **3D computational model** to simulate how **heat moves through the human body** under microgravity.
- Incorporates **sweating, shivering, clothing effects, organ heat, and blood redistribution** to simulate real conditions.
- **Key findings of the model include:**
 - **Hands and feet become cooler** in space over time.
 - **Head, abdomen, and core body** regions become **warmer**.
 - During exercise in space, the **body temperature rises faster** than it does on Earth.
 - **Core body temperature can rise from 36.3°C to 37.8°C** in 2.5 months of microgravity exposure.
 - With exercise, the temperature may rise to **nearly 40°C**, a potentially dangerous level.
- The model's accuracy was **validated using past data** from astronauts onboard the **Mir Space Station** and the **International Space Station (ISS)**. The predicted results matched historical observations.
- The model also estimates the **Universal Thermal Climate Index (UTCI)**, which reflects how **hot or cold it feels** outside by factoring in **wind, humidity, and solar radiation**.

Source: **TH**

Source: <https://vajiramandravi.com/current-affairs/microgravity/>

© Vajiram & Ravi. For personal use only.