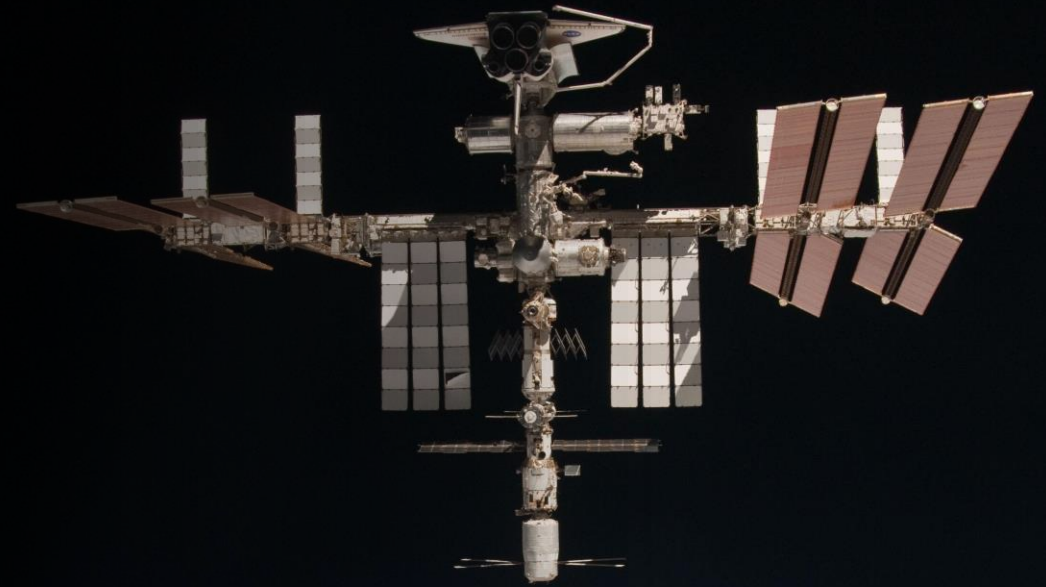


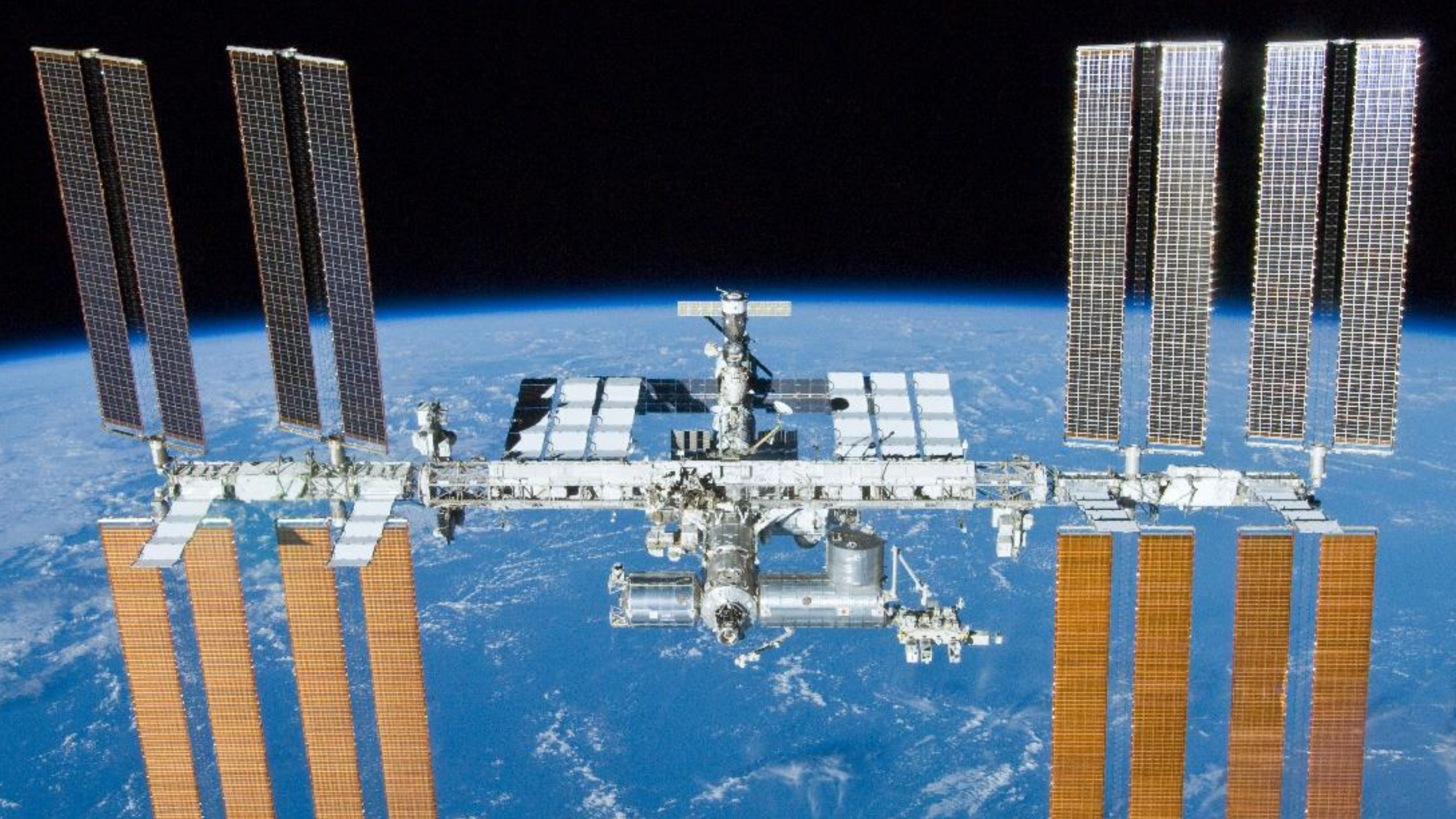


Practicing Medicine on the Edge

Tom Marshburn MD
NASA Astronaut

16th Annual Ski and Mountain
Trauma Conference







NATIONAL AERONAUTICS & SPACE ADMINISTRATION



LYNDON B. JOHNSON SPACE CENTER





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C/O Scott Cirkin

USA 2004 02 02 000





“At any moment, without warning, you may find yourself making a decision that has ultimate consequences”







Tom Marshburn

Joe Acaba

Jim Burcham

Jim Sutton

Shane Kimbrough

Dwight Dool

Roby Satcher

Chris Cassidy

Ricky Arnold

Shane Kimbrough











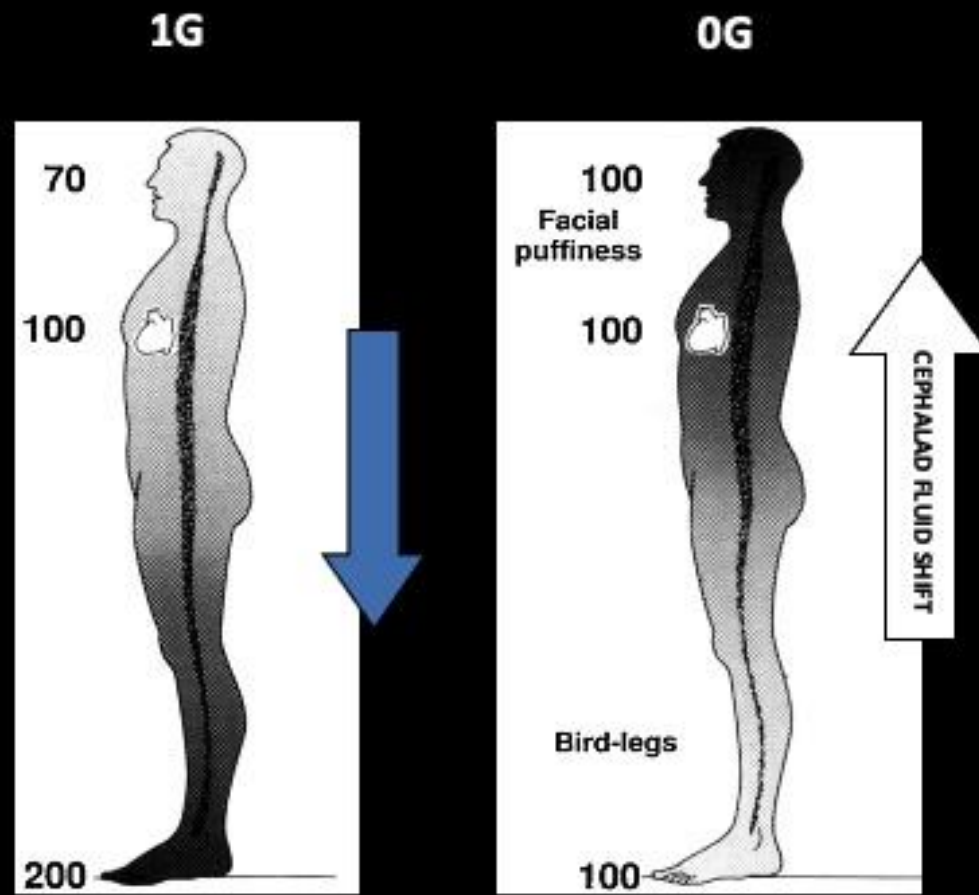








Weightlessness → Fluid Shifts



- Increase in cardiac output
- 15% plasma volume loss
- Fluid transfer into interstitial and intracellular compartments
- 15% RBC mass decrease

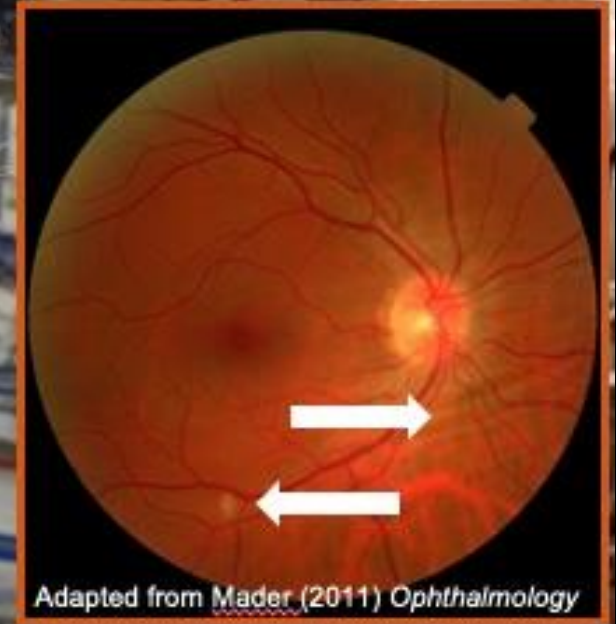
The most prominent health challenges facing human beings flying in space

- SMS
- Trauma: Eyes, hands, EVA
- SANS, clotting, MSK and CV atrophy
- Exercise, fatigue, out of range contaminants
- Radiation
- Psychological
- Diagnosis and treatment
- Single system effects: immune, derm, vascular

SANS

Spaceflight Associated
Neuro-ocular Syndrome

Globe flattening
Nerve sheath thickening
Visible retinal pathology
Optic Disc swelling







A full-page background image featuring an astronaut in a red spacesuit on the left side. The astronaut is wearing a white helmet and has a NASA logo on the chest. The background is a deep blue space with a bright light source on the left and a satellite with solar panels in the upper right. The text is overlaid on the right side of the image.

Space Setting: Diagnosis/Therapy

New normal exam.

Adaptive physiology may alter presenting signs and symptoms and/or response to pharmaceutical agents.

The major skill set is most likely not onsite.

Diagnostic /therapeutic resources are limited.



Significant Spaceflight Medical Events

- **Kidney stone**
- **Cardiac Dysrhythmias**
- **Burns**
- **Inhalation injuries**
- **Eye injury**
- **Dental problems**
- **Severe back pain**
- **Urinary retention**
- **Vision Changes**
- **Clotting**



