

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Interactive Presentations - IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (IP)Author: Mr. Nihat Tagizade
AzerbaijanBEYOND GRAVITY: EXPLORING THE INTERPLAY OF MICROGRAVITY ON HUMAN
PHYSIOLOGY DURING SPACE MISSIONS**Abstract**

Embarking on the once-dreamed-of journey of spaceflight has unveiled a fascinating reality, pushing the boundaries of human exploration. Yet, this cosmic odyssey presents an intricate challenge – the impact of microgravity on the human body. An understanding of these physiological adaptations becomes paramount for astronaut health and the triumph of extended space missions. In the microcosm of microgravity, the musculoskeletal system undergoes a metamorphosis. Bones, liberated from gravity's embrace, surrender minerals, culminating in diminished bone density and an augmented fracture risk upon Earthly return. Supported by research like "Spaceflight-induced Bone Loss: Is There an Osteoporosis Risk?" by Smith et al. (2012), it crystallizes the urgency for countermeasures, exemplified by exercise regimens employing resistance bands (Jones et al., 2014). The cardiovascular ballet in microgravity is eloquently documented. Studies such as those by Hughson et al. (2016) delineate the pooling of blood in the upper body, heralding diminished cardiac output and blood flow to the lower extremities. This orchestrated dance can lead to post-return dizziness, stressing the need to unravel and address cardiovascular intricacies during space voyages. Fluid systems, a symphony in gravity's embrace, face discord in microgravity. "Fluid and Electrolyte Metabolism in Space" by Leach and Rambaut (1976) unveils the disruption of the hydrostatic pressure gradient, potentially manifesting in facial puffiness and a minute cranial expansion. The symphony of physiological harmony in space thus underscores the importance of vigilant monitoring. Microgravity's effects reverberate through sensory and nervous systems, manifesting in space motion sickness and ocular challenges. Mader et al.'s (2013) study, "Alterations in the Eye Following Long-duration Space Flight," delves into these challenges. Such insights are the compass guiding the formulation of strategies to preserve the wellbeing of astronauts in the cosmos. Yet, amidst these challenges, astronauts emerge as resilient pioneers, sculpting their own destiny through exercise, dietary adaptations, and specialized equipment. As Lackner and Dizio's (2006) research posits in "Countermeasures against Space Motion Sickness," these measures stand as testament to human adaptability, carving a niche for maintaining vitality in the cosmic unknown. The exploration of human physiology in space transcends the confines of astronaut health, unraveling the tapestry of fundamental biological processes on Earth. As we ascend into the cosmic expanse, decoding how gravity weaves through our physiology emerges as the linchpin for the health and prosperity of future spacefarers.