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## AGING AND PUTATIVE FRAILTY BIOMARKERS ARE ALTERED BY SPACEFLIGHT

**Abstract**

Human space exploration is associated with several environmental factors that alter astronauts' health: space radiation, altered gravity, hostile and closed environments, and isolation and confinement. The impact of this environment is associated with molecular changes, such as genomic instability, mitochondrial dysfunction, increased inflammation, homeostasis dysregulation, and epigenomic changes. These processes share similarities with the biological aging process seen on Earth and could lead to chronic consequences such as cardiovascular diseases and cancer. However, little is known about the link between these changes and disease development in space. Frailty syndrome is a robust predictor associated with biological aging, however, its existence during spaceflight has not been examined. We used murine data from NASA's GeneLab and astronaut data from JAXA and Inspiration4 missions to evaluate the presence of biological markers and pathways related to frailty, aging, and sarcopenia. We identified changes in gene expression that could be related to the development of a frailty-like condition. These results suggest that the parallels between spaceflight and aging may extend to frailty as well. Future studies examining the utility of a frailty index in monitoring astronaut health appear warranted.