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GENOMIC EXPLORATION IN MICROGRAVITY: MESSAGE (MICROGRAVITY ASSOCIATED GENETICS) SCIENCE MISSION PRELIMINARY RESULTS

Abstract

The "Microgravity Associated Genetics Science Mission" (MESSAGE), conducted in Axiom-3 and supported by the Turkish Space Agency and TUBITAK UZAY (SPACE TECHNOLOGIES RESEARCH INSTITUTE) in January 2024, represents a pioneering endeavor in the exploration of genetic responses to microgravity. Üsküdar University TRGENMER laboratory aimed to analyze the transcriptome profile (pro-inflammatory profile, clock-gene expressions, anxiety and major depression associated gene expression, neurodegeneration associated gene and miRNA expression, anti-aging gene expression including telomere, SIRT family, FOXO etc.) of blood samples from individuals exposed to microgravity, with a primary focus on identifying genes influenced by altered gravity and their potential impact on immune system cells, particularly anti-cancer activity. This research not only contributes to the understanding of space medicine but also holds promise for novel strategies in cancer treatment and immune system modulation on Earth. The study's well-defined scientific rationale, clear objectives, and robust experimental design, using advanced transcriptomic profiling techniques, position it as a significant advancement in genomic exploration beyond Earth. Building on the transcriptomic insights gained from blood samples exposed to microgravity, this phase of the study aims to understand and potentially modify the genetic underpinnings of immune system cells. Specifically, the team targeted T cells, exploring the nuanced intersection of microgravity, gene expression, and CRISPR-induced genetic modifications. The scientific merit review underscores the innovative nature of this dual-phase research, emphasizing its potential to redefine our understanding of genetic responsesinspace. This study adds a unique dimension to this space-genetics exploration, symbolizing a collaborative leap into the scientificfrontier including microgravity, immunology and cancer immunotherapy.