

Summary of: Immunological and hematological outcomes following protracted low dose/low dose rate ionizing radiation and simulated microgravity

Key findings and quantitative results:

****Immune System:**** - No significant differences in immune differentials were observed. - However, hematological system analyses revealed large disparities in red blood cell differentials and morphology. - Spleen DEG were associated with signal transduction, metabolism, cell cycle, chromatin organization, and DNA repair pathways. - Immune modifications persisted to 1 week post-simulated spaceflight.

****Hematological System:**** - CBC showed no significant differences between controls and post-simSpace. - RBC and HGB levels were significantly reduced. - MCH, MCV, and RDW were significantly increased. - MCHC and HCT levels were not significantly different.

****Pathways:**** - Five major functional pathways were affected: metabolism, cell cycle, chromatin organization, DNA repair, and signal transduction. - Multiple genes were upregulated in the spleen, including cation transporters, solute carrier genes, and ubiquitin pathways. - Downregulated genes were involved in inflammation, cell cycle, and DNA repair pathways.

****Long-term Consequences:**** - The study highlights the need for personalized medicine to address the complex interplay of immune and hematological responses. - The prolonged effects of spaceflight on the immune and hematological systems suggest a need for readjustment during readaptation to Earth's gravity. - The study underscores the importance of longitudinal studies to understand the full impact of spaceflight on astronauts.

****Limitations:**** - The study's cross-translation to humans is limited. - Baseline and longitudinal results are not provided. - The absence of galactic cosmic ray radiation testing parameters further restricts the study's applicability.

****Conclusion:**** - The study identifies key DEG and DEG pathways engaged in systemic blood circulation. - The results suggest that prolonged exposure to deep spaceflight environments has lasting effects on the immune and hematological systems. - The need for personalized medicine to address the complex interplay of immune and hematological responses is highlighted.