

SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Human Physiology in Space (2)

Author: Dr. Laura Drudi  
McGill University, Canada, laura.drudi@mail.mcgill.ca

Dr. Richard Boyle  
National Aeronautics and Space Administration (NASA), United States, richard.boyle@nasa.gov

Dr. Joan Saary  
St. Michael's Hospital, Canada, joan.saary@utoronto.ca

## IMMUNE DYSREGULATION IN SPACEFLIGHT

**Abstract**

Microgravity-induced changes to normal human physiology have been monitored since the dawn of manned-spaceflight. This has driven research in aerospace medicine investigating the effects of spaceflight on the human body at all levels, from overt behavior and psychophysical tests to microscopic and molecular studies.

Living in space requires a comprehensive understanding of the human immune response to the space environment. New antigens might be introduced to the space traveler or a renewed challenge might be mounted to an existing pathogen. Once the degree of health risks is assessed in crewmembers, solutions to mitigate the effects of immunosuppression to allow safe missions must be developed.

This paper reviews the literature related to spaceflight-associated immune perturbations, with a focus on lymphoid cells, with a goal to identify and summarize the issues related to short- and long-term space missions. As a next step, 7 mice thymus tissues flown on STS-131 will be compared to 7 ground mice thymus tissues using light microscopy and electron microscopy.

It is of great research and clinical importance to determine if the immune system is perturbed in spaceflight, and continued study of this topic is needed. Immunology studies in general require highly controlled environments, often beyond the capability of an unmanned mission. For manned missions the organisms must be certified pathogen-free, and infectious agents are prohibited. To date solid immunological data are limited, interpretations have been controversial, and for human studies the evidence is mostly anecdotal. Much more data are required to provide a comprehensive appreciation of immunological perturbation in spaceflight. It is essential to consider the effects of spaceflight on the human body in order to prevent life threatening risks as the endeavors to space exploration continue.