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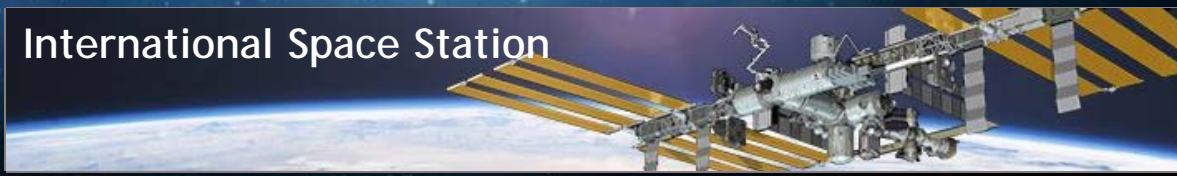
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Fact Sheet

Text Size

T-Cell Activation in Aging (T-Cell_Act_in_Aging)

12.05.12

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Experiment Overview

This content was provided by Millie Hughes-Fulford, Ph.D., and is maintained in a database by the ISS Program Science Office.

Brief Summary

The main objective of TCELLSUP is to investigate the earliest key events of immune activation, specifically T-cell activation, during microgravity exposure to characterize the role of the candidate molecular regulatory factors and cellular factors in the inhibition of T-cell activation. Space flight T-cell specimens will be obtained from mid-age adults (ages 30 – 55) and ground study T-cells will be from older adults (over 65). The comparison of T-cell activation data between these two groups will provide scientists with further insight into understanding and identifying specific factors that may play a critical role in immune function loss during aging. The discoveries from the TCELLSUP may lead to development of medical treatments that can be used to maintain normal immune function through out life on Earth and in space.

Principal Investigator(s)

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Co-Investigator(s)/Collaborator(s)

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Developer(s)

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Sponsoring Space Agency

National Aeronautics and Space Administration (NASA)

Sponsoring Organization

National Laboratory - National Institutes of Health (NL-NIH)

ISS Expedition Duration

March 2013 - October 2013

Expeditions Assigned

35/36

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Experiment Description

Research Overview

- The change in the immune function of the elderly occurs over a long period of time and results in a significantly reduced ability to combat infection and disease. However, the root cause of the changes that result in reduced immune function in the elderly is poorly understood. The same types of changes in immune response occur in healthy Astronauts during spaceflight microgravity exposure. The microgravity-influenced changes in immune cells were found to occur rapidly at

the molecular level, which means microgravity provided an excellent platform to investigate immune functional changes that normally occur over a very long period of time. A critical step in the immune response to infection is the activation of the T-cell. Recent space flight studies of T-cell function in rodents and isolated T-cells led to the discovery that T-cell activation was suppressed under the microgravity condition and led to the identification of candidate molecular regulatory factors that may be involved in loss of immune response. The main objective of TCELLSUP is to further investigate the earliest key events of immune activation, specifically T-cell activation, during microgravity exposure to characterize the role of the candidate molecular regulatory factors in inhibition of T-cell activation. Also, this space flight study will include other critical aspects of T-cell activation by examining the production of very early cytokines and their receptors.

- Specific goals:
 - 1. Identify the gene expression pattern of the candidate molecular regulators under microgravity versus 1xg condition.
 - 2. Identify the target genes of the candidate molecular regulators using bioinformatics analysis of gene array data and verify changes in expression of those target messages (qRTPCR) for the microgravity environment.
 - 3. Analyze the protein synthesis of predicted target genes that are affected by T-cell activation under normal and altered gravity conditions.
 - 4. Compare the expression of the candidate molecular regulators and other genes found in the microgravity experiment to activated T-cells from the older population (> 65 years)
- The comparison of T-cell activation data between these two groups will provide scientists with further insight into understanding and identifying specific factors that may play a critical role in immune function loss during aging. The discoveries from the TCELLSUP may lead to development of medical treatments that can be used to maintain normal immune function through out life on Earth and in space.

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Information provided by the investigation team to the ISS Program Scientist's Office.

If updates are needed to the summary please contact [JSC-ISS-Program-Science-Group](#). For other general questions regarding space station research and technology, please feel free to call our help line at 281-244-6187 or e-mail at [JSC-ISS-Payloads-Helpline](#).

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