

Overview of Pre-flight Physical Training, In-flight Exercise Countermeasures and the Post-flight Reconditioning Program for International Space Station Astronauts

Eric Kerstman, MD, MPH
University of Texas Medical Branch, Galveston, TX

Introduction

International Space Station (ISS) astronauts receive supervised physical training pre-flight, utilize exercise countermeasures in-flight, and participate in a structured reconditioning program post-flight. Despite recent advances in exercise hardware and prescribed exercise countermeasures, ISS crewmembers are still found to have variable levels of deconditioning post-flight.

Purpose

This presentation provides an overview of the astronaut medical certification requirements, pre-flight physical training, in-flight exercise countermeasures, and the post-flight reconditioning program.

Methods

Astronauts must meet medical certification requirements on selection, annually, and prior to ISS missions. In addition, extensive physical fitness testing and standardized medical assessments are performed on long duration crewmembers pre-flight. Limited physical fitness assessments and medical examinations are performed in-flight to develop exercise countermeasure prescriptions, ensure that the crewmembers are physically capable of performing mission tasks, and monitor astronaut health.

Upon mission completion, long duration astronauts must re-adapt to the 1 G environment, and be certified as fit to return to space flight training and active duty. A structured, supervised postflight reconditioning program has been developed to prevent injuries, facilitate re-adaptation to the 1 G environment, and subsequently return astronauts to training and space flight.

Conclusion

The NASA reconditioning program is implemented by the Astronaut Strength, Conditioning, and Rehabilitation (ASCR) team and supervised by NASA flight surgeons. This program has evolved over the past 10 years of the International Space Station (ISS) program and has been successful in ensuring that long duration astronauts safely re-adapt to the 1 g environment and return to active duty. Lessons learned from this approach to managing deconditioning can be applied to terrestrial medicine and future exploration space flight missions.

Learning Objectives

The audience will learn how NASA manages the deconditioning of astronauts exposed to long duration microgravity on ISS missions.