

Rehabilitation after International Space Station Flights

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Rehabilitating U.S. crew members to preflight status following flights on the Russian Mir Space Station required longer than six months for full functional recovery of some of the seven crew members. Additional exercise hardware has been added on the International Space Station as well as a rehabilitative emphasis on functional fitness/agility and proprioception. The authors will describe and present the results of the rehabilitation program for ISS and evaluate rehabilitative needs for longer missions. Pre- and in-flight programs emphasize strength and aerobic conditioning. One year before launch, crew members are assigned an Astronaut Strength and Conditioning specialist. Crew members are scheduled for 2 hours, 3 days a week, for pre-flight training and 2.5 hours, six days a week, for in-flight training. Crewmembers are tested on functional fitness, agility, isokinetic strength, and submaximal cycle ergometer evaluation before and after flight. The information from these tests is used for exercise prescriptions, comparison, and evaluation of the astronaut and training programs. The rehabilitation program lasts for 45 days and is scheduled for 2 hours during each crew workday. Phase 1 of the rehabilitation program starts on landing day and places emphasis on ambulation, flexibility, and muscle strengthening. Phase 2 adds proprioceptive exercise and cardiovascular conditioning. Phase 3 (the longest phase) focuses on functional development. All programs are tailored specifically for each individual according to their test results, preferred recreational activities, and mission roles and duties. Most crew members reached or exceeded their preflight test values 45 days after flight. Some crew members subjectively indicated the need for a longer rehabilitation period. The current rehabilitation program for returning ISS crew members seems adequate in content but may need to be extended for longer expeditions.