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Author: Dr. Klaudia Vivien Nagy
Semmelweis University of Health Sciences, Hungary

PHYSICAL PREPARATION FOR SPACEFLIGHT – RESULTS OF THE HALF YEAR TRAINING PROGRAM OF THE HUNOR - "HUNGARIAN TO ORBIT" ASTRONAUT CANDIDATES

Abstract

Introduction: The microgravity conditions in space lead to significant muscle and bone mass loss during long-duration space missions. Furthermore, the adequate decision-making and concentration under these special circumstances is only possible with excellent physical condition. Therefore, the physical preparation of astronauts is essential for the successful completion of the mission.

Objectives: Our goal was to develop a comprehensive training program specialized for astronaut candidates, along with a measurement protocol for continuous monitoring of their fitness to maximize performance.

Methods: Within the framework of the HUNOR (Hungarian to Orbit) Hungarian astronaut program, four astronaut candidates began their basic astronaut training in April 2023. Physical preparation is part of the program, including strength training, heart rate-controlled cardio training, swimming sessions, physiotherapy, and dietary counseling. Clinical assessments were conducted every six weeks, including laboratory tests, body composition measurements, resting ECG, echocardiography, cardiopulmonary exercise test (CPX), and swimming lap tests.

Results: Comparing the April (A) and November (N) results of the four male candidates (age: 353.5 years), it is notable that their vitamin D levels significantly increased (A: 23.69.5 vs. N: 53.617.1 ng/L) due to the supplementation. During the CPX, load time (A: 13.20.8 vs. N: 15.80.3 min; 14.3-24.0

Conclusions: The candidates showed excellent progress during the first six months of the physical preparation program, with significant improvements in endurance and body composition. The comprehensive program supports the safety and the success of the mission and contributes to the development of innovative objectives in space exploration projects.