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Challenges of Life Support/Medical Support for Human Missions (8)
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THE INFLUENCE OF DIET ON BEHAVIOR IN SIMULATED SPACE MISSION CONDITIONS

Abstract

Admission. Outer space is a great challenge for the human body. It is very difficult and expensive to learn about the effects of diet in space on human health, not only from a technical but also a medical point of view. Objective. The aim of the study was to analyze the effects of three types of diet (control, high-protein, high-carbohydrate) on behavior and health in conditions of isolation from sunlight and time. Material and methods. Investigations were performed in the AATC habitat in Poland, which is specially adjusted laboratory to run bioastronautics research, especially to simulate lunar and martian missions. Two crews named Bright 1 and Bright 2 were composed of healthy analog astronauts, young males and females. Each of the crew participated in three 2 week-long analog simulations related with three tested diet types. Experiments were performed in fully controlled environmental and physiological conditions in isolation under constant temperature, humidity, time and lighting. The habitat was equipped with multiple sensors including cameras. Sensory monitoring allowed us for the identification of changes in group dynamics, changes in stress levels and emotional states of the crew. In addition, blood and saliva samples were collected for pre- and post-mission biochemical analysis. Serum samples and measurements related with body composition were subjected to metabolic analysis. Results. The results were developed using statistical methods and were used to verify the knowledge about the influence of dietary ingredients and selected products on the behavior of astronauts in a simulated space mission. The results led to the conclusion that all analog astronauts experienced weight loss, even though the implemented diets were not reducing diets. A statistically significant relationship was obtained between weight loss and a high-protein diet. This diet also characterized the highest level of satisfaction among the crew members. All analog astronauts confirmed that diet had a profound effect on their satisfaction levels and morale during performed missions. Conclusions. In future perspective, this research will support elaboration of diets dedicated for a long-term space missions to the Moon and Mars.