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DIET IN ISOLATION REFLECTED IN METABOLOMICS, EMOTIONS AND WATER UPTAKE  
DURING LUNAR ANALOG MISSIONS IN ANALOG ASTRONAUT TRAINING CENTER

**Abstract**

Space analog missions in isolation provide unique conditions for experiments on humans. All participants named analog astronauts undergo exactly the same daily routines, same food, same water, same physical activity and sleep duration. In this work we present results from six cycles of two-week analog missions in the BIGHT Project. The Bright missions consisted of two analog astronaut crews exchanging each other in the habitat from July to September 2020. Experiment was standardized in repeatable laboratory conditions controlled by the Mission Control Center. The main objective of these missions was testing human physiology and psychology in response to three different types of diet: control diet (first two weeks), high protein diet (next two weeks) and vegetarian diet (last two weeks). Each crew was entering a specific type of diet for two weeks followed by two weeks of break. Such a procedure was repeated in the same manner each month to prevent complications in data analysis caused by the menstrual cycle of female subjects. During the mission analog astronauts followed the schedule including the habitat maintenance and realization of individual tasks. Saliva, urine, feces and blood samples were collected before, during and at the end of each mission for the biochemical analyses. The collected samples were used to test the levels of cortisol, melatonin, serotonin, testosterone and albumin. The analysis was performed using the Enzyme-Linked Immunosorbent ELISA kit according to the procedure specified by the manufacturer of the kits used. Water uptake and urine volume were measured regularly by each participant everyday during the mission. Salivary protein concentration was determined by the Bradford method. Psychological data were generated during the mission in the form of Emoji test everytime before and after the meal. Results reveal differences between each type of diet highlighting the importance of food selection for isolated missions. During this experiment it was observed a significant change in metabolomics. Based on these studies several specific diet markers were characterized. Analog missions in isolation seem to be a promising environment to perform high quality comparable data on humans.