

Great Food, No Atmosphere: A Review of Performance Nutrition for Application to Extravehicular Activities in Spaceflight

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Abstract : Background: Extravehicular activities (EVAs) are a critical aspect of missions aboard the International Space Station (ISS). It has long been noted that the spaceflight environment and the physical demands of EVA cause physiological and metabolic changes in humans; this review aims to combine these findings with nutritional studies in analogues of the spaceflight and EVA environments to make nutritional recommendations for astronauts scheduled for and immediately returning from EVAs. Results: Energy demands increase during orbital spaceflight and see further increases during EVA. Another critical element of EVA nutrition is adequate hydration. Orbital EVA appears to provide adequate hydration under current protocol, but during lunar surface EVA (LEVA) and in a 10km lunar walk-back test astronauts have stated that up to 20% more water was needed. Previous attempts for in-suit edible sustenance have not been adequately taken up by astronauts to be economically viable. In elite endurance athletes, a mixture of glucose and fructose is used in gels, improving performance. Discussion: A combination of non-caffeinated energy drink and simple water should be available for astronauts during EVA, allowing more autonomy. There should also be provision of gels or a similar product containing appropriate sodium levels to maintain hydration, but not so much as to hyperhydrate through renal water reabsorption. It is also suggested that short breaks be built into the schedule of EVAs for these gels to be consumed, as it is speculated that reason for low uptake of in-suit sustenance is the lack of time available in which to consume it.

Keywords : astronaut, nutrition, space, sport

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