SPACE LIFE SCIENCES SYMPOSIUM (A1)
Human Health : Countermeasures (2)

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THE LARGE RADIUS HUMAN CENTRIFUGE : THE HUMAN HYPERGRAVITY HABITAT, H3

Abstract

Over the last decades a significant body of knowledge has been gained on the adaptation of the human body going into near weightlessness conditions as well as for the re-adaptation to 1g Earth conditions after an orbital space flight. Ground-based paradigms for microgravity simulation have been developed such as head down tilted bed rest or dry-immersion studies. In such systems adaptations of the human body to long term immobilization and increased upper-body fluid shifts bed have been studied. But could we learn something on human body adaptations to altered gravity conditions using centrifuges? How does the body adapt to a long duration (days, weeks or longer) exposure to a hypergravity environment? And, once the body has fully adapted to a hypergravity environment, how does it re-adapt going from a hypergravity condition to a relatively hypo-gravity condition of 1g, or even going from centrifuge / hypergravity environment into a bed-rest setting? Can such transitions learn us something about the gravity transitions as a crew will experience going to Moon or Mars. Is hypergravity therefore a good model to study the effect of re-entry in gravitational environments after long duration space flight? We propose a Topical team in which we will address these questions as mentioned earlier. We like to address the questions for all organ systems known to change under altered gravity conditions. We will identify to which gravity levels the human body can be exposed to for longer periods of time and what protocols could be applied to address the questions at hand. We also need to identify if and how we could perform such long duration hypergravity and re-adaptation studies. Issues like ethics, safety and required technology should be addressed. The final outcome of the Topical team will be a clear answer about the feasibility of hypergravity, and if and how hypergravity studies can provide useful knowledge to support future space flight on the one hand and the medical issues in e.g. the ageing population with its contemporary lifestyle on the other hand (osteoporosis, cardiovascular diseases, obesity).