Paper ID: 41826
oral

SPACE LIFE SCIENCES SYMPOSIUM (A1)
Interactive Presentations (IP)

Author: Mr. Philippe Hazane
Institute for Space Medicine and Physiology/MEDES, France

SIMULATE MICROGRAVITY ON THE GROUND TO PREPARE MANNED SPACEFLIGHT

Abstract

The space flights carried out to nowadays have shown the possibilities of man's adaptation to space. However, the spatial environment and particularly microgravity cause physiological changes that are likely to affect the performance and astronauts' health. These include cardiovascular deconditioning, muscle atrophy, changes in bone level, or psychological difficulties related to confinement.

These studies in orbit are essential for the future of space exploration. However, some scientific research is impossible to carry out during space flights. Indeed, the number of astronauts remains low and the experimental equipment is often impossible to embark (MRI, etc.). Experiments simulating the effects of weightlessness are then carried out on the ground in order to better understand the mechanisms of adaptation of the organism, to prepare space flights and to develop preventive measures.

The MEDES Spatial Clinic in Toulouse, France, is conducting this type of exceptional clinical study on behalf of the French Space Agency (CNES) and the European Space Agency (ESA) but also for other space agencies (NASA, CSA, JAXA ...). Many international scientific teams, selected by the agencies, are involved in this research.

Two simulation models of weightlessness are offered by MEDES to the scientific teams: anti-orthostatic bedrest and dry immersion.

Anti-orthostatic bedrest is the most commonly used model. It consists of sleeping volunteers in an elongated position, the head a little lower than the feet, with an angle of -6 . This position induces a migration of body fluids to the upper body, changes in blood volume, cardiac performance, vascular resistance, etc., as seen in space.

Dry immersion is a complementary model. The volunteer is "immersed" several days in a kind of bathtub but isolated from the water by a tarpaulin. This model presents the interest of a support distributed evenly over the whole body surface and interpreted by the human organism as a complete absence of support, a situation comparable to that of real microgravity.

MEDES proposes to reconsider the importance of these studies, their conditions of implementation and the actors involved, illustrated by 2 recent studies carried out in the premises of its Space Clinic : - The first study using the dry-immersion model in Europe conducted on behalf of CNES - The first campaign of a 60-day bed rest study conducted on behalf the European Space ESA and CNES. These two studies illustrate the Medes know-how and the skill of its teams in conducting challenging clinical trials.