

ICARE project (2007)



ICARE was a project financed by ESA, with a duration of 18 months and which started in 2007.

Main objectives

- * **Prevent muscle and bone loss experienced by astronauts in space and by the elderly or sedentary person on Earth.**
- * **Develop an integrated countermeasure to fight against both bone loss, muscle loss and neurosensory disorders (proprioception).**

The context of the project

The human being has shown that he can live and work in the space environment. However, psychological and physiological issues like exposure to radiation, bone loss, muscle atrophy etc. are still limiting factors for long duration manned space missions.

Countermeasures to prevent the desadaptation of neurovestibular, cardiovascular, muscular and bone functions are not yet fully effective and require significant crew time. There is therefore a need for integrated, efficient, fast and well-accepted countermeasures, enabling to maintain the astronaut's health, during space flights and to prepare the return under gravity environment on earth or on other planets.

The development of such countermeasures is also of great interest for public health with the increase of sedentary lifestyle and the ageing of the population.

Partners



A modular approach

The activities proposed were based on a rigorous review of the scientific and technical state-of-the-art. One key issue for designing an integrated countermeasure for astronauts was the type of mechanical stimuli and the type of whole body loading to apply.

The challenge of the ICARE project was **to achieve an integrated countermeasure and effective to fight against both bone loss, muscle loss and the troubles of the neurosensorial system modular equipments scientific workshop**

In October 2007 a scientific workshop was conducted to define with experts in the field of space and "non-space" (geriatrics, rehabilitation) the scientific specification of such countermeasure, as well as to provide recommendations on the development of countermeasures for the next 10 years.

A system compatible for on-ground validation

The ICARE system was designed to be compatible for ground validation, in particular during bed rest studies. ICARE concepts enabled to deliver calibrated and controlled loads during ground based simulations. **ICARE was basically designed as a countermeasure system**, but can easily integrate additional functions for scientific assessment of the concept or for scientific studies.