The DLR Space Administration is funding four AGBRESA research groups

Effectiveness of artificial gravity for reducing musculoskeletal degradation and pain during and after bed rest (bone-muscle pain)

Space missions, bed-rest studies and a lack of movement during periods of illness all lead to a loss of bone and muscle mass. The main cause of this is a lack of gravity. A promising countermeasure is to train in artificial gravity using a short-arm centrifuge. The research group led by Gabriele Armbrecht from the Centre for Muscle and Bone Research at Charité Berlin wants to learn more about the extent to which this training can combat degradation. The research group intends to compare its observations with other training methods. The study findings will be incorporated into training concepts for space missions and for patients who are required to undergo bed rest for significant periods of time.

The effect of artificial gravitation regimens on neurocognitive performance during bed rest in a head-down position (NeuroGravity)

Very little is known about how artificial gravity affects human cognitive ability. In an effort to make advances in this area, Vera Abeln and her team will conduct brain measurements and perform cognitive tests on the test participants. The scientists from the Institute of Movement and Neurosciences and the Centre for Health and Integrative Physiology in Space at the German Sport University in Cologne hope to gain insights into how artificial gravitation can prevent loss of cognitive performance. Bedridden patients on Earth might also benefit from these findings if given NeuroGravity treatment to mitigate immobilisation-related deterioration.

Physical performance and biological age

The research group led by Markus Gruber in the Department of Sport Science at the University of Constance is principally interested in biological age. The current hypothesis is that two months of bed rest significantly increases the biological age of participants, but that this rapid, inactivity-induced ageing process is reversible.
The results of this study will enable a determination of how effective artificial gravity can be as a countermeasure to physical inactivity. In addition, the group will describe in greater detail the effects of physical inactivity on biological age, as well as the correlation with physical performance.

Effects of artificial gravity on muscle strength and neuromuscular interaction during 60 days of bed rest. Muscle inactivity-induced atrophy and intermittent artificial gravity (MIAG)

Muscle strength is not dependent on size alone, but also on how the muscle is controlled and used. At present, nothing is known about how a centrifuge changes this neuromuscular control in human physiology.
Hans Degens, from Manchester Metropolitan University, and his project group will use a variety of experiments to investigate this issue. The scientists expect their findings to enable optimisation of muscle training during crewed spaceflight. The results will also enable a better understanding of muscle weakness and frailty affecting bedridden patients and the elderly.