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SPACE MUSCLE STEM CELL CULTURE EXPERIMENT MISSION FOR MUSCLE ATROPHY IN
ASTRONAUTS

Abstract

Muscle atrophy in astronauts, a frequent phenomenon happened in Astronauts' long-term space life, could be caused by microgravity, space radiation or other unknown factors. It is essential and urgent to test the effect of medicament for muscle atrophy in astronauts by space experiment. Observation of morphological changes in the growth of muscle cells has been proved feasible and effective for revealing the pathogenesis mechanism and testing drug efficacy. Therefore, a space life science experiment will be carried out by Shanghai Engineering Center for Microsatellites (SECM) to explore the mechanism of space muscle atrophy and the screening of appropriate drugs. This will be the first time for China to carry out space culture experiments of human muscle stem cells. It is planned to observe the morphological changes of muscle stem cells in multiple passages. Small scale small molecule screening is also planned to be performed to validate the small molecules found on ground. To reach the target, two key technologies are adopted, one is the in vitro culture technique of muscle stem cells, the other is the technology of changing growth medium and differentiation medium on orbit. The former was completed by CAS center for Excellence in Molecular Cell Science, who has achieved more than 20 times of subculture of muscle stem cells in vitro. The latter was completed by SECM, which developed a set of AI system for judging the current growth state according to the morphological changes of cells, and add growth medium or differentiation medium at the right time according to the results. The effect of the AI system has already been validated in ground research. Cell incubator in satellite will adopt integrated design which can culture 12 groups cell according to different needs. The real-time photography is carried out by using a 10 times magnification imaging system. The whole satellite is designed the size of 6U and is expected to be about 10kg. The space experiment is planned to be carried out by the end of 2021 with the primary aim of finding the lead compound for the treatment of muscular atrophy in astronauts.