

SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Human Physiology in Space (2)

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KEYNOTE: PROGRESS AND PROSPECT OF SPACE MEDICINE EXPERIMENTS IN CHINA

**Abstract**

Systematically planning and implementing space medicine experiments is an important way to solve the restrictions during long-term manned spaceflight caused by major medical problems. In Shenzhou-9 mission, frontier theories, including physiology, cytology, molecular biology, fluid mechanics, material science, optics, microelectronics, etc., were innovatively integrated. More than ten key technical difficulties were overcome, including full closed micro-flow reagent for the determination of transmission, multiple physiological information synchronization monitoring and analysis, steady-state wide linear detection for diverse samples in closed micro-reaction system, etc. We established the technical system of space medicine experiments, on which prospective and innovative studies have been performed, including assessing on-orbit health risk, exploring the physiological effects of weightlessness, validating the novel protection technology, studying the molecular mechanisms of space medical problems, etc. Thus, the space experiments have been accomplished successfully, occupying systems biology, psychology, behavior study and cytology. With the established biochemical parameters detection methods and circadian rhythm characterization analysis techniques for medical monitoring, on-orbit medical monitoring technical system

was enriched. It is the first time to get the systematical and characterized data from Chinese astronauts, including the changes of cardio-vascular, vestibular, and cerebral function, and circadian rhythm patterns. Also, new evidence was found, indicating the regulatory role of actin filaments on gene promoter activity. Since the project of Chinese space station officially started, space medicine experiments have developed into a significant part in the application field of space station mission, in terms of ensuring the health, safety and performance of mankind during long-term spaceflight in low Earth orbit. Currently being planned five research directions include the effects of long-term weightlessness on astronaut's health and the protective techniques, influence of space radiation on astronaut's health and the protective techniques, behavior and performance of astronauts, advanced on-orbit medical monitoring and treatment, and applicable techniques of traditional medicine in space. Through implementation of Nvwa Plan, data of space environmental effects and psychological changes will be systematically collected and accumulated, human system risk evaluation system will be established more perfectly, and innovative protection techniques will be developed. Therefore, it will facilitate the theoretical and technical reserves for long-term spaceflight, and promote the unceasing development of manned space flight project.