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DESIGN AND REALIZATION OF SPR BIOCHEMICAL SENSING AND DETECTING SYSTEM IN SPACE

Abstract

Surface Plasmon resonance (SPR) has been widely applied in bio-chemical sensing, pharmaceutical analysis, environmental monitoring and many other fields. Based on the requirements of Chinese manned space technology development, the medical biochemical measurement equipment using surface plasmon resonance is made to measure the value of the 3-NT, so that it provides a comprehensive and effective medical supervision data foundation which the medical supervision and medical protection work of supervisor doctor can stand on. Objective: Long-term astronauts living and working in the confined, narrow, weightlessness of space vehicles, physiological and psychological status will change. Urine 3 - nitro tyrosine levels is detected quantitatively to advance warning astronaut stress response level, and provide an objective basis for ground supervisor doctors medical supervision, so it is necessary to make use of professional equipment regularly to monitor astronaut urine 3 - nitro tyrosine levels. Methods: Design a fully enclosed micro-flow detecting equipment which uses SPR sensor as the detecting core, according to pre-set the experimental processes, a different reagent is selected by the four-way valve, micro flow start and stop, the flow rate is controlled using the peristaltic pump, the device transmits the collected data to the ground, according comparison with the foundation of basic data, then astronauts' changes of stress response levels is judged in orbit. Results: Establish the fundamental database by regular testing astronauts level of stress response before and after the flight, in the Shenzhou-9 mission, each of the two male astronauts makes two urine tests, experimental results show that the astronauts stress response has been elevated clearly and stably, set up a collection and analysis of the stress response levels suitable for space missions requirement. Conclusion: The devices fully meet the requirements of a manned flight in astronauts urine 3-nitro tyrosine measurement, reveals the differences of the stress response in orbit with the ground level, provides richer monitoring indicators and information support for medical supervision and protection in manned flight.