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THE SIGNIFICANCE OF FATIGUE IN THE OPERATIONAL SPACE MEDICAL SETTING

Abstract

The spaceflight environment poses many challenges to astronauts from physiologic alterations to psychological effects. There are many microgravity-induced changes to the human body; however, the effects of fatigue are underappreciated in the medical community and the consequences of sleep debt can pose a significant problem. Sleep is an essential biological process playing a role in maintaining cognitive function and performance. However, the spaceflight environment may not always be conductive to sleep as a result of insufficient sleep periods, light-dark transitions resulting in circadian dyssynchrony, and acoustic noise. These factors may lead to degradation of sleep quality thus resulting in increased chances of errors and mishaps, as well as decrements in performance and inability to cope with adversity and other challenges. Identification, prevention and mitigation of the consequences of fatigue through pharmacologic, and non-pharmacologic interventions are essential and further research should address this imperative topic. Future studies may assess the use of software programs including Fatigue Avoidance Scheduling Tool (FAST), Sleep, Activity, and Fatigue Task Effectiveness (SAFTE) model and real-time fatigue technologies in the operational aerospace medical setting, which may prove to be indispensable as fatigue countermeasures. This paper will address the issue of fatigue on four different levels: 1) the causes of fatigue in the spaceflight environment, 2) the consequences of fatigue in operational space medicine, 3) fatigue countermeasures, and 4) possible directions of future studies. This review can serve as a foundation for the development of fatigue risk management policies or future studies directed at understanding, managing and mitigating fatigue in professions where circadian rhythms are disrupted such as in astronauts, commercial and Air Force pilots, air traffic controllers, as well as medical professionals. A change in perception of fatigue in the medical community may alter into a practice where zero tolerance to fatigue-related medical error may one-day become a reality, which will foster a better and safer health care system.