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FIBROIDS AND ASTEROIDS: THE GYNECOLOGICAL SYSTEM IN SPACE

Abstract

Aim: Since the first female astronaut traveled into space in 1963, only 11 percent of astronauts worldwide have been women. However, this number has been steadily increasing within the past decade. This project aims to summarize the breadth of our understanding of space exploration on gynecological health with the goal of enabling safer spaceflight for female astronauts.

Method: A preliminary scoping literature review was performed. Database searches were conducted using PubMed and Google Scholar for papers written in English that were published from 1950 to 2022. Search terms included “women”, “female”, “gender”, “gyn”, or “reproductive system” and “spaceflight”. We also included the search terms “microgravity”, “radiation”, “isolation”, “diet”, or “sleep” because they were anticipated to have possible implications for reproductive health. Results were categorized into three sections based on gynecological changes associated with the chosen environmental hazards (ie microgravity, radiation, or spacecraft living conditions).

Results: A total of 7432 articles were initially identified. After removal of duplicates and preliminary review, 30 papers were retained for detailed review. Both human and animal studies based on terrestrial and spaceflight data revealed that the female reproductive system is sensitive to microgravity, radiation, and spacecraft living conditions as expected. Disruptions to gynecological health during spaceflight include tumor promotion, reactivation of sexually transmitted diseases, anovulation, and sex hormone dysregulation. Oocyte cryopreservation might be a possible countermeasure for future missions. Additional considerations to enable reproductive health might include modifications to dietary and sleep hygiene as well as radiation protection.

Conclusions: Space exploration poses health risks associated with gynecological changes that are unfavorable for reproductive health. These results are important given the age of most female astronauts at the time of recruitment for space missions. Research on this topic is limited, suggesting a gap to be filled as recreational and longer-term space exploration continue to advance.