

The Impact of Sex and Gender on Human Adaptation to Space

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In order to certify that men and women can live in space, NASA needs to know the physiological changes that occur during space travel. NASA pioneered bedrest studies utilizing healthy humans. Thus far, flying men and women in space has not revealed gender or sex response differences that cause major health concerns. However with longer duration stays in space, it is increasingly important for NASA to be armed with the knowledge needed to ensure the health and safety of all male and female astronauts. The application of sex based similarities and differences in healthy people are not restricted to space. Nor are these differences inconsequential. Sex based biomedicine is important to exposures and occupations as extreme as the Antarctic, high altitude, deep sea, and to communities as diverse as the military, international aid workers, emergency and rescue workers, the elderly and children. During this presentation, findings from a landmark workshop, developed in partnership with the University of Missouri, will be presented. Six work groups that focused on musculoskeletal, cardiovascular, reproductive, neurovestibular, and immunological systems as well as human behavior were established. Differential studies of men and women in challenging environments are difficult to conduct. The small amount of data from space can be complemented by ground based studies. This workshop was the first step in defining what is required for policy and implementation, resources and infrastructure, and establishing research priorities to fully understand the impact of sex and gender on biomedical science and health.