

**Summary Testimony for  
the  
United States House of Representatives Committee on Science, Space, and  
Technology  
for Hearing on  
“Human Spaceflight Ethics and Obligations: Options for Monitoring,  
Diagnosing, and Treating Former Astronauts”**

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Chairman Babin and Ranking Member Edwards, thank you for the opportunity to submit testimony on this timely and vitally important subject.

I am a Professor of Bioethics and Public Policy at the Johns Hopkins Berman Institute of Bioethics in Baltimore. I appear before you today in my capacity as chair of the Institute of Medicine (now National Academy of Medicine) Committee on Ethics Principles and Guidelines for Health Standards for Long Duration and Exploration Spaceflights, which issued its report in April 2014. In addition, I also currently am chair of the Board on Health Sciences Policy for the Health and Medicine Division of the National Academies of Science, Engineering, and Medicine, and a member of the Division’s standing Committee on Aerospace Medicine and Medicine of Extreme Environments.

In those contexts, I will describe recommendations contained in the report of the Committee on Ethics Principles and Guidelines for Health Standards for Long Duration and Exploration Spaceflights (Ethics Committee) related to protecting and sustaining astronaut health. [<http://www.nap.edu/catalog/18576/health-standards-for-long-duration-and-exploration-spaceflight-ethics-principles>]

As outlined in the 2001 Institute of Medicine report *Safe Passage*, and as noted in the Ethics Committee’s report, the new challenges that will be faced in long duration and exploration spaceflight necessitate a relook at the ethics principles for these missions:

“Current ethical standards for clinical research and practice with astronauts were developed in an era of short space missions when repeat missions were the norm and a return to Earth within days was possible. In future missions beyond Earth orbit, however, a diverse group of astronauts will travel to unexplored destinations for prolonged periods of time. Contact with Earth will be delayed, and a rapid return will be impossible. Long-duration missions beyond Earth orbit, space colony habitation, or interplanetary travel will create special circumstances for which ethical standards developed for terrestrial medical care and research may be inadequate for astronauts. These ethical standards may require reevaluation.” (*Safe Passage*, 2001, p. 173)

Our committee noted that NASA, as an employer, a federal agency responsible for innovation and exploration, a research sponsor, and an international partner, has moral obligations to formally recognize and act on responsibilities that logically flow from the ethics principles outlined in our report if long duration and exploration spaceflights are to be acceptable. Among the six principles identified by the committee, two are particularly relevant for discussion in the context of health care for former astronauts. Those principles are (1) fairness, and (2) fidelity.

“Fairness—the principle requires that equals be treated equally, that burdens and benefits be distributed fairly, and that fair processes be created and followed. NASA’s decision making surrounding missions should explicitly address fairness, including the distribution of the risks and benefits of the mission, crew selection, and protections for astronauts after missions.” [Ethics Committee report, p. 128]

An important ethical challenge of exposing humans to the risks of long duration and exploration spaceflight is that the burden of the health risks associated with these missions falls to a limited number of astronauts and their families while the benefits of the proposed missions accrue primarily to future astronauts and to society more broadly. In addition to being a concern of appropriate risk-benefit *balance*, the appropriate risk-benefit *distribution* must also be considered. Asking individuals to accept great risk (either in likelihood or magnitude of harm) can be partially balanced by making a commitment to provide long-term health care and health monitoring.

“Fidelity—the principle recognizes that individual sacrifices made for the benefit of society may give rise to societal duties in return. Given the risks that astronauts accept in participating in hazardous missions, NASA should respect the mutuality of obligations and ensure health care and protection for astronauts not only during the

mission but after return, including provision of lifetime health care for astronauts.” [Ethics Committee report, p. 128]

Those who consent to incur long-term health risks for society’s benefit are entitled to fidelity, reflected in society’s commitment to minimize any harms that emerge, whenever they emerge. The committee noted that “this concept of fidelity or reciprocity resonates with the basic, widely shared understanding that it is unjust to allow “some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole.”” [Armstrong v. United States, 364 U.S. 40, 49 (1960)] As a practical matter, the public cannot physically share the risks that astronauts will bear. It can, however, share the costs and burdens of ongoing risk-mitigation efforts.

An astronaut’s consent becomes binding and irrevocable at the moment the mission launches. Astronauts are free to withdraw their agreement to participate prior to launch of course, but from the launch moment forward, it becomes nearly impossible to turn back, and astronauts likely will encounter uncertain and unquantifiable risk exposures and endure potential harms to health that will persist after the mission.

The irrevocability of participation in spaceflight creates an ethical imperative to define long-term duties owed to the participating astronaut. In this context the principles identified by our committee support the minimization of risk of harm, the treatment of injuries or health conditions during the flight, and the ongoing monitoring and provision of health care after the flight. This binding duty to provide ongoing surveillance, monitoring, and health care during the lifetime of the astronaut is part of the continuum of risk management that begins with engineering and design efforts to minimize risk and continues through the flight and postflight.

Our committee concluded that the ethics responsibilities that result from sanctioning high-risk activities include continuous learning and engagement in health-related activities that protect astronaut health, support ongoing evaluation of health standards, improve mission safety, and reduce risks for current and future astronauts.

Employers that knowingly expose employees to risks have an ethical responsibility to provide protection to the extent possible and to address the harms that occur when protection fails or turns out to be inadequate. Robust research and health-monitoring or surveillance programs that fully inform all who are involved, including astronauts and their families, are required. Furthermore, the committee maintained that the

nation, through NASA, has the ethical duties to protect and sustain astronauts' health based on the ethics principles of fairness and fidelity. Providing lifetime health care to astronauts respects the commitment that astronauts have made and the risks they have taken on society's behalf.

Thank you.