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**Statement of
Scott Kelly
Retired Astronaut
National Aeronautics and Space Administration**

before the

**Subcommittee on Space
Committee on Science, Space and Technology
U. S. House of Representatives**

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the importance of understanding the medical impacts of human space flight on astronauts and the proposed legislation on astronaut health. This issue is of critical importance to me and to our nation's future space exploration initiatives.

I recently returned with my colleague Russian Cosmonaut Mikhail Kornienko from nearly a year in space aboard the International Space Station which serves as our best asset for understanding how human physiology behaves in a microgravity environment. Until at least 2024 the space station will continue to provide a platform for research on astronaut health and many other scientific investigations.

The major objective of this Year in Space mission was to expand the experience and knowledge base required to safely send humans deeper into our solar system. A Mars mission is no easy feat and could require astronauts to be in space for three years or more. During this mission, we conducted more than 400 experiments in the fields of biology, material sciences, chemistry and physics. Many of these experiments focus on how the human body responds to weightlessness and other effects of long duration spaceflight. One of these experiments dubbed the "Twins Study," gave researchers the unique opportunity to study my physiology while in space compared to my twin brother, retired astronaut and Navy Captain Mark Kelly, on Earth. Data acquired from this Year in Space mission will help NASA make determinations that will directly affect decisions regarding crew safety in the years to come in areas from the design of future spacecraft to medical and psychological risk mitigation. Although I have been home for 100 days, much of the data is still being analyzed by researchers from around the world.

Much attention is paid to the risks astronauts face while launching aboard rockets or returning to Earth in a giant fireball. Much less attention is given to the other risks astronauts face which are much more insidious but potentially just as fatal. The environment astronauts are exposed to while in space is unlike anything we experience here on Earth. Specifically, astronauts are exposed to high levels of radiation and carbon dioxide, and a micro-gravity

environment which causes loss of bone and muscle, vision impairment and effects on our immune system to name just a few. These are very real issues that need to be solved before the human race is able to reach destinations beyond the Earth and Moon.

When I returned after 340 days, I was surprised at how differently I felt compared to my previous long-duration mission of 159 days. My muscles more quickly stiffened, and because my skin had not touched anything for nearly a year, it was extremely sensitive and became inflamed. I developed a hive-like rash on every surface of my skin that came in contact with ordinary surfaces on Earth during normal activities like sitting or lying in bed. My legs were swollen due to the shift of fluid gravity forced upon my body. I even had flu-like symptoms that appear to have been a result from my extended time in space.

Exposure to the space environment has permanent effects we simply do not fully understand. The “Lifetime Surveillance of Astronaut Health” Program NASA has in place to study astronaut long term health is too limited to provide the data needed to ensure the safety of our space explorers. If we are to go beyond low-Earth orbit, NASA needs the ability to proactively and aggressively monitor, diagnose and treat astronauts who serve our country in the name of science and exploration. Expanding healthcare coverage for our U.S. astronaut corps will enable NASA to more effectively and efficiently support it and collect the data necessary to push out further into our solar system.

Furthermore, continued investigation of space-related ailments and mitigation steps will help in treating similar ailments on Earth, such as osteoporosis, muscle wasting diseases, high blood pressure, glaucoma and certain brain disease, to name a few. There are already FDA-approved treatment modalities which are a result of space based research.

Although Mars and other long-term NASA objectives seem to be many years ahead of us, laying a secure foundation for astronaut health is imperative to the continuance of our nation’s ability to explore. Healthcare for our astronauts is critically important. Our astronauts are exposed to numerous health risk factors while in space and while we are aware of some of the impacts we need more data from astronauts in space and on the ground to better understand the negative effects the harsh microgravity environment of space has on the human body.

The proposed legislation on astronaut health will not only help us learn more about the impacts of human spaceflight but also will serve to protect the health of those who push the boundaries in the name of exploration on behalf of our nation.

We are on the cusp of a new space age – one in which greater numbers of Americans will travel to space and go farther than ever before. I was honored to play a small role in paving the way for those future pioneers but want to make it clear this Year in Space mission was not my achievement. It was the achievement of thousands of dedicated professionals that believe like I do that the benefits of human spaceflight are vital to the continued success and development of our nation and our species.

Mr. Chairman, I would be happy to respond to any questions you or the other Members of the Subcommittee may have.