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It is said that the most dangerous parts of spaceflight are the launch, the landing and everything in between. To those of us in space medicine, another part also has danger written all over it—the space normal body trying to recover to its Earth normal state. Early on in both the American and the former Soviet Union's space endeavors there was a guarded curiosity about how man would survive spaceflight. There was cautious optimism when the early Gemini program returned all astronauts safely back to planet Earth. The only medical flag was unconsumed food, a harbinger of space-related sickness that continues to plague many space travelers.

As technology and aspirations advanced, eight-day voyages to the moon tested the balance of medical monitoring with operational activities. There was a deeply rooted distrust of medical personnel, for the "Right Stuff" was not about getting sick and being prevented from flying. It was about the astronaut image—the hardiest of creatures, the American Dream. To this day, medical issues have remained largely out of public consciousness mainly because of privacy of information. Most want to believe that astronauts are super-humans and that human technology will support our beliefs. After all, if we can think it, we can do it. At least that is what chasing the dream is all about. But frailty thy name is human.

To understand the context of what Chris Hadfield is experiencing back on Earth after 146 days floating in space, we can look to others like Canadian Dr. Robert Thirsk who orbited Earth in the International Space Station for 187 days 20 hours, or Cosmonaut Valeri Polyakov who endured the MIR Space Station for 437 days 18 hours. My return was fraught with things that I found fascinating as a neurologist and space medicine researcher, such as being unable to do a sit-up or protect myself from a sudden fall. The nervous system is quite adaptable to spaceflight and we cannot will these gravity-related reflexes to remain when they are not needed. The light headedness and heavy bed cover during recovery were as interesting as letting go of a coffee cup in mid-air as I temporarily forgot about gravity. And those were only the superficial things from a short duration mission. Our team's research on astronauts and cosmonauts returning from two dozen missions of variable lengths found changes in blood flow to the brain, inducing a susceptibility to fainting.

For short duration missions of a few weeks, my rule for recovery has been roughly one day down for every day up. Dr. Thirsk suggested that for every month in space, one needs two months on Earth to recover. The longer one stays in space, the longer and more protracted the recovery. NASA's "Lifetime Surveillance of Astronaut Health" program recognizes the increased risk that the reduced gravity of space places on those who work there.

For example: there is bone loss that may continue for some time after landing and may not be recoverable; radiation that can lead to chromosomal breaks, and in mouse models, cognitive impairment with accumulation of Alzheimer's disease-associated plaque;

immunologic changes in space that can compromise a human body's defences against infection; and muscle loss from disuse.

Many years after I postulated that fluid shifts experienced by a floating astronaut would raise pressure on and in the brain, there is recent evidence to support this theory. Imaging of the eye and brain in returning astronauts with ongoing visual loss has proven that both the eye and even the brain itself can sustain long-term structural changes.

What does this have to do with frailty? It is about not understanding the balance between the romantic view of spaceflight that we cling to and the not so appealing world of hurt that is the reality after long duration spaceflight. Before signing up for a Mars mission, it would be most prudent and ethical to reach back to our closer moon to figure a few things out.

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