

How a space doctor keeps astronauts healthy on the ISS

April 22 2021, by Issam Ahmed



European Space Agency flight surgeon Adrianos Golemis, in Cape Canaveral, Florida

From muscle loss to radiation exposure and the psychological effects of confinement, spaceflight takes a toll on those lucky enough to experience it.

European Space Agency flight surgeon Adrianos Golemis, who is responsible for the health of astronaut Thomas Pesquet during the SpaceX Crew-2 mission, shared some insights on the field of [space medicine](#).

Q: What are the major health challenges of space?

A: If we talk about low Earth orbit where the ISS lies, you have almost [zero gravity](#) so that takes its toll on your bones and your muscles.

Radiation is a major issue, because here on the ground we are protected by the magnetosphere (magnetic field) and by the atmosphere, but if we go beyond, this protection goes away.

And of course we should not forget we have things that we are just beginning to understand: for example eye pathology (disease), or [venous thrombosis](#) ([blood clots](#)) that some healthy astronauts develop.

Q: What have scientists learned so far about how much radiation our bodies can take?

A: You could fly two or three missions of six months to the ISS probably without a very significant effect on your health.

What we are aiming for is that your risk of developing cancer should not be higher than three percent as compared to a person exactly like you that has never gone to spaceflight.

Q: What are the other impacts of weightlessness?

A: We are adapted for life in one G.

If you take that away, the veins in your feet will still keep pushing blood to your head as if you were in one G, so you end up with more blood in the upper part of your body.

You can see sometimes they really have this puffy face in the beginning of the mission.

Eventually the circulatory system adapts, and the body becomes used to a lower volume of blood. Before they leave the ISS, we tell astronauts to drink a lot and eat a lot of salt.

Q: The astronauts are fully vaccinated against Covid-19, do they still need to be tested?

A: They are in a quarantine, but we did have two final PCR tests. And this is to be 100 percent sure that they are not even carriers.

The immune system underperforms when we are without gravity. People can develop infections that they would normally not develop, even to the microbes that we naturally carry in our body

Q: The crew spend two hours a day on [exercise equipment](#) to keep them in shape—are you also routinely in touch?

A: We have a standard video call once a week for 15 minutes.

In the beginning of the mission we would mainly check for space motion sickness, after you go from one G to zero G.

Your mind has a little bit of trouble, there is some sensory conflict between your inner ear, and what your eyes see. And this can create

some vomiting.

Later in the mission, we will look for other effects: notably, psychology, or cognitive performance.

When you stay in an environment like the ISS, you're really in a very small place, so you don't have new stimuli and that has an effect on you psychologically.

Mentally, it's not so easy to focus or retain information.

Q: Apart from being well stocked in medicine, what kind of medical equipment is up there?

A: We can for example analyze the hematocrit (a red blood cell test). We can understand from that if they are hydrated enough, and what the changes are going on in their circulatory system.

A couple of years ago, we came across some observations of thrombosis. No one expected that in healthy individuals, and this also gives us some new understanding of how the body works on our planet.

We now have ultrasound capability, and if someone develops symptoms like pain or dilation, another member of the group can perform an ultrasound to assess if this is a clinical case of thrombosis.

If you have a case where the astronaut's life or well-being is really threatened, we would go for evacuation.

Luckily in the 21 years that ISS has flown, that hasn't happened.

Q: What does it take to become a space physician?

A: For me it was a medical degree to start with. Then I did a master's degree in space studies at the International Space University, (in Strasbourg, France).

I spent a year in Antarctica as a doctor so I got a good understanding of a situation which was akin to spaceflight medicine. Eventually I went to Toulouse to Medes, the French Institute of Space Medicine and Physiology.

Right now the European Space Agency is recruiting new astronauts and you can apply until the end of May. If you have a dream, you should always try.

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