

By Tereza Pultarova

# Space Weather May Increase Risk of Sudden Death

**W**hen the ISS flew over the aurora borealis, as the space station entered a geomagnetic storm earlier this year, the crew was amazed by the beauty of the glowing light through which they travelled. Hypnotized by the million shades of colors, they probably were not thinking about the potential danger that the beautiful phenomenon may have posed to their health.

But according to the results of research conducted by Russian cardiologists on the Mars 500 crew, space weather events can significantly increase the risk of heart attack and stroke even in healthy individuals. "There is a medical condition commonly called 'sudden cardiac death'," explains Dr. Oleg Atkov, former Russian cosmonaut and trained cardiologist working at the Russian State Medical State Research University. "It is a natural, sudden and unexpected case of cardiac failure leading to death, where you don't have any evidence or history of previous diseases. And suddenly, something happens."

Together with his colleague Yuri Gurfinkel from Central Clinical Hospital in Moscow, Atkov studied changes in microcirculation in Mars 500 crew members during major geomagnetic storms caused by powerful coronal mass ejections from the Sun. "We were particularly focused on investigating changes in microcirculation on nail beds or in the eyes," says Atkov, "the research gave us quantitative information on what is going on during the geomagnetic storms – how the blood flow is changing and how the sludge phenomenon occurs."

Blood sludge is a medical condition wherein erythrocytes glue to each other into small blood clots, leading to major cerebrovascular events like strokes and thrombosis, which can cause sudden death in otherwise perfectly healthy individuals. "When the block in microcirculation forms in the right atrium, [...] or in [the] central nervous system, it can have fatal consequences," Atkov concludes. Should an accident like that happen in low Earth orbit, it would take too long to give the stricken astronaut timely medical care.

**“Space weather can significantly increase the risk of stroke even in healthy individuals,”**

The negative effects of geomagnetic storms caused by space weather events on human health have been known for a long time, but it was commonly assumed that space weather could affect only people suffering from ischemic disorders or hypertension. But the research results obtained from healthy Mars 500 crew members suggests that practically no one can be considered safe from the influence of geomagnetic phenomena.

Russian scientists have studied the effects of geomagnetic disturbances on

human health for several years. Medical records collected in Moscow show that during such events an abnormally high incidence of cardiovascular events takes place even on Earth, with an increase in heart attacks of up to 13% and an increase in blood-strokes of up to 7.5%. Data on cosmonauts exposed to geomagnetic disturbances during flight or landing are also available: they show changes in pulse, blood pressure, reduction of heartbeat rate variability, and more irregular heartbeat patterns.

According to Atkov, space weather influences on cosmonauts' health was not yet a research focus at the time of his 8 month mission to the Salyut 7 space station in 1983. Back then, researchers were just discovering the sources of arrhythmia that occurs time to time during space flight.

Despite the medical concerns, astronauts and cosmonauts continue to consider space flight exciting and worthwhile, and keep enjoying the unique view of phenomenon like the stunning aurora borealis of January 2012.



Aurora borealis caused by powerful geomagnetic storm as photographed from ISS in January 2012. - Credits: NASA