NASA Uses Vertical Treadmill to Improve Astronaut Health in Space

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NASA is using a new treadmill that allows people to run while suspended horizontally to help astronauts prepare for long-duration missions to the moon and beyond.

A team of engineers at NASA's Glenn Research Center in Cleveland built the Standalone Zero Gravity Locomotion Simulator to imitate conditions astronauts experience while exercising in space. Exercise in microgravity helps lessen the harmful health effects of long-duration space travel, promoting astronauts' well-being and mission success.

NASA currently is sending astronauts on six month missions to the International Space Station and plans to launch humans on missions to the moon by 2020. Crew members will benefit from data NASA gathers from bed rest studies conducted with the device. NASA's Johnson Space Center, Houston, will manage the studies that will be conducted at the University of Texas Medical Branch in Galveston. NASA will use the locomotion simulator to develop improved exercise routines for astronauts during spaceflight.

"These studies are a key component of our research into how we can better protect astronauts," said Linda Loerch, project manager for the Exercise Countermeasures Project at Johnson. "The focus of our work is to understand how to maintain astronaut health and performance at the highest possible levels, both on our current flights aboard the International Space Station and for future exploration beyond Earth orbit."

Living in weightlessness can lead to aerobic deconditioning, muscle atrophy and bone loss, all of which can affect an astronaut's ability to perform physical tasks. On the International Space Station, crew members exercise daily to help counter the effects of prolonged weightlessness.

The treadmill simulates zero gravity by suspending human test subjects horizontally to remove the torso, head and limbs from the normal pull of gravity. Participants are pulled toward a vertically-mounted treadmill system where they can run or walk. The forces against a test subject's feet are precisely controlled and can mimic conditions of zero gravity in low Earth orbit or conditions on the moon, which has one-sixth the gravity of Earth. In addition to simulating exercise protocols, the device may be used to imitate the physiological effects of spacewalking.

Cleveland Clinic in Ohio collaborated closely with NASA in the development of the treadmill and currently is conducting bed rest studies with a similar device to understand how exercise during simulated spaceflight affects the muscles and bones.

"We are very proud of the collaborative effort this team put forth to develop this system," said Gail Perusek, project manager for Exercise Countermeasures at Glenn. "It required interdisciplinary expertise in engineering, controls and biomechanics, and we are confident it will facilitate valuable research for years to come."

The Standalone Zero Gravity Locomotion Simulator project and associated studies are under the direction of the Human Research Program within NASA's Exploration Systems Mission Directorate.

Source: NASA