Astronauts Grow Liver Tissue on International Space Station

A low-gravity environment may help grow liver organoids, or miniature organs, that can be used in medical research and transplant surgeries.

November 11, 2024 By Laura Schmidt

Astronauts aboard the International Space Station (ISS) will test the effects of microgravity on liver cell regeneration, potentially transforming the future of liver transplantation and tissue engineering, according to an ISS National Laboratory news release.

About 103,200 people are currently on the national transplant waiting list, and more than 6,000 people die each year while awaiting an organ, according to the Health Resources and Services Administration.

University of California, San Francisco (UCSF) researchers will send tissue chips—small devices designed to replicate the function of human tissue—containing liver cells and immune cells to space to better understand the mechanisms behind the decline of liver regeneration in older adults, according to the news release.

Led by Tammy Chang, MD, PhD, FACS, a professor of surgery at UCSF, the study aims to observe the unique conditions of microgravity and its effects on human physiology. Funded by the U.S. National Science Foundation, the upcoming experiment is set to begin in early 2025. Researchers will grow tissues aboard the station for two weeks and then send them back to Earth for analysis.

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Organs naturally grow in a developing embryo that floats in amniotic fluid in the womb. Therefore, gravity can negatively impact the way tissues are grown in laboratory dishes on Earth. For example, gravity can pull cells to the bottom of a dish or put cells under stress because their dish must be consistently moved to keep the cells suspended as they grow, according to Live Science.

To avoid the effects of gravity, researchers have developed rotating bioreactors that simulate a low-gravity environment by spinning very quickly, which allows tissues and miniature organs, or "organoids," to grow in artificial conditions. But these bioreactors also put stresses on tissue, which led researchers to test the efficacy of growing organoids on the ISS.

Chang and colleagues believe these organoids may grow better in a high-quality microgravity environment, such as the ISS.

"Our findings indicate that microgravity conditions enable the development of liver tissues with better differentiation and functionality than those cultured on Earth," Chang told the American College of Surgeons. "This represents a critical step toward creating viable liver tissue implants that could serve as an alternative or adjunct to traditional liver transplants."

The findings could help give rise to the development of personalized, space-grown tissues and organs that may be used in transplant surgeries. What's more, tissue could be transplanted to treat a variety of liver-function diseases and disorders, Chang told Live Science.

"My ultimate goal for these tissues, if they are doing what we imagine and hope they are able to become with the help of microgravity, is to use these tissues for therapy," Chang said.

To learn more, click #Liver Transplant. There, you'll find headlines such as "Chicago Marathon Runner Finishes Race Cancer-Free and With New Liver," "Biden-Harris Administration Issues Proposed Rule to Expand Access to Life-Saving Organs for People with HIV" and "Study Encourages More Hepatitis C Positive Liver Donations for Transplants."

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