

SpaceX CRS-24 launching multiple life science investigations to the International Space Station

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The microgravity environment on the International Space Station (ISS) has a profound impact on cells and tissues, allowing researchers to

conduct life sciences research in ways not possible on the ground. SpaceX's 24th Commercial Resupply Services (CRS) mission to the orbiting laboratory will deliver a variety of life science payloads sponsored by the ISS National Laboratory. From stem cell research on neurodegenerative diseases to a tissue chip experiment studying the blood-brain barrier and an investigation testing the use of bacteria to protect DNA from the stresses of spaceflight—the research launching on this mission is helping to improve the quality of life for people on Earth.

Microgravity affects organisms—from bacteria to humans—inducing changes such as altered gene expression and DNA regulation, changes in cellular function and physiology, and 3-D aggregation of cells. Research leveraging these effects can drive advances in pharmaceutical development, disease modeling, regenerative medicine, and many other areas within the life sciences. Below are highlights of several [life sciences](#) investigations sponsored by the ISS National Laboratory that are launching on SpaceX CRS-24.

The National Stem Cell Foundation is collaborating with the Exomedicine Institute on a unique 3-D study of neurodegeneration in the absence of gravity using cells from patients with primary progressive multiple sclerosis (PPMS) and Parkinson's disease (PD). This marks the first time that disease-specific cells from patients with PPMS and PD will be studied on the ISS to observe the cell-to-cell interactions of neurodegeneration and neuroinflammation when the gravitational forces affecting cells on Earth are removed. Results from this investigation, which is supported by ISS National Lab Commercial Service Provider Space Tango, could further enhance knowledge regarding the genetic makeup of these debilitating diseases.

Boston-based pharmaceutical company Emulate is launching an investigation using proprietary tissue chip technology to examine the effects of microgravity on the blood-brain barrier. This project, funded

by the National Center for Advancing Translational Sciences (part of the National Institutes of Health), builds on an initial tissue chip investigation that Emulate launched in 2019. Tissue chips contain human cells grown on an artificial scaffold to model the structure and function of human tissue. For this study, Emulate will use its Brain-Chip, which consists of living neuronal and vascular endothelial [cells](#) in a micro-engineered environment. The [blood-brain barrier](#) is a semi-permeable barrier that allows selective passage of certain molecules and gasses while preventing the passage of others. It is a critical component involved in maintaining homeostasis, and disruption of the barrier can lead to or cause neurological dysfunction or disease. Results from this investigation, which is also supported by Space Tango, may provide insight into the relationship between inflammation and brain function, leading to a better understanding of [neurodegenerative diseases](#) such as Alzheimer's and Parkinson's.

DNA components are integral to synthetic biology and bioengineering of organisms for a variety of applications, such as producing pharmaceuticals, improving consumer products, and developing clean plastics. An investigation from ISS National Lab Commercial Service Provider Rhodium Scientific, in collaboration with Lawrence Berkeley National Laboratory, will test the use of specific bacterial strains to protect and preserve DNA during the stresses of launch, in-orbit stowage, and return to Earth. Results could help to create more rugged biological components and advance these technologies for use in space and in extreme environments on Earth.

These are only a few of the ISS National Lab-sponsored investigations launching on SpaceX CRS-24. This mission, contracted by NASA, is slated to launch no earlier than December 21 at 5:06 a.m. EST from NASA's Kennedy Space Center. To learn more about all ISS National Lab-sponsored research launching on this mission, please visit our launch page.

More information: Launch page:
www.issnationallab.org/launches/spacex-crs-24/

Provided by International Space Station U.S. National Laboratory

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