



ISS NATIONAL LABORATORY®
CENTER FOR THE ADVANCEMENT OF SCIENCE IN SPACE®

Introduction to the Tissue Chips in Space 2.0 Program on the International Space Station

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5 March 2026

INTERNATIONAL SPACE STATION NATIONAL LAB HISTORY

2011

NASA awards the Center for the Advancement of Science in Space (CASIS) a Cooperative Agreement to manage the ISS National Lab in partnership with NASA to broadly:

- Sustain access to LEO for full utilization of the ISS to enable research and technology development that benefits humanity,
- Expand commercial presence in LEO to explore the viability of and lay the foundation for sustainable economic activities in space.

2010

Congress directs NASA to partner with a not-for profit entity and guarantee access to, and utilization of, not less than 50% of the U.S. research capacity allocation, including power, cold stowage, and crew time onboard ISS.

2005

Congress designates the U.S. segment of the ISS as a national laboratory

2024 ISS National Lab Igniting Innovation Awards

- **Cedars-Sinai Medical Center:** Aims to grow cardiac spheroids with blood vessels from induced pluripotent stem cells in space for cardiovascular disease modeling and to test how cancer drugs affect the heart.
- **Easra Biotech & University of Connecticut:** Seeks to produce cancer therapeutics in space using Janus base nanomaterials (JBNs) designed to target drug delivery to solid tumors, improving cancer treatment and reducing side effects.
- **University of California, San Diego:** Seeks to use patient-derived tumor organoids to study accelerated cancer development in microgravity and identify new cancer therapeutic targets.
- **University of Texas MD Anderson Cancer Center:** Aims to use microgravity to better understand how T cells work and develop new immunotherapy treatments for cancer and autoimmune diseases.
- **Wake Forest Institute for Regenerative Medicine (WFIRM):** Seeks to use organoids created from cells recovered from colorectal cancer patients to develop improved chemotherapies.



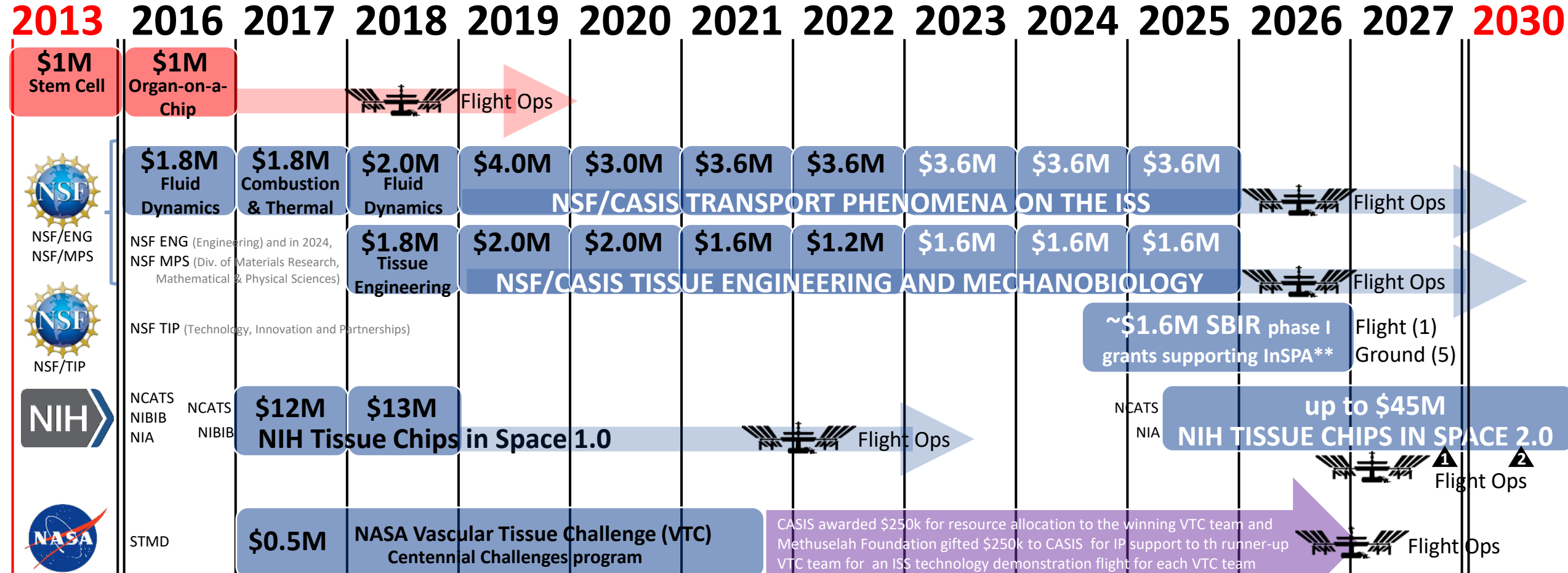
ISS National Lab Sponsored Research with Other Government Agencies (OGAs)*



ISS National Lab funding

Other Government Agency funding

Public:Private funding



* Funding committed by a U.S. Government Agency other than NASA SOMD (Space Operations Mission Directorate) for research on the ISS sponsored by ISS National Lab.
 **Phase I NSF seed funding (SBIR/STTR) in the NSF Space (SP) technology topic area supporting NASA-ISS National Lab InSPA related projects.

NSF/CASIS Joint Solicitations



- Transport Phenomena (2016-2025): **47 awards**
- Tissue Engineering (2018-2025): **23 awards**
- Total NSF funding contributed: **>\$40M**
- **Account for at least 38% of our peer-reviewed publications**

NIH/CASIS Tissue Chips in Space program



- Tissue Chips in Space (2016-2018): **9 awards: >\$11M in NIH funding awarded from NCATS and NIBIB for up to 2 ISS flights**
- Tissue Chips in Space 2.0 (2025): **6 awards: up to \$45M in NIH funding available from NCATS and NIA for up to 2 flights to LEO**
- Total NIH funding contributed: **\$55-\$70M**



Tissue Chips in Space

- In 2016 and 2017, NCATS and NIBIB committed over **\$20M in grant funding** toward 9 projects
- ISS National Lab committed **~\$8M in-kind** and **resources for 2 flight opportunities to ISS**
- To leverage **microphysiological systems in μg** as **accelerated disease models** leading to improved diagnosis and treatment for disease



Tissue Chips in Space 2.0

- In the first phase, researchers will design MPS that mimic complex organ systems.
- Each MPS will be validated and tested on Earth and in space to ensure that the chips are able to support μ g experiments accurately replicating normal and diseased human states.
- After NIH review of results from the first mission, the 2nd phase will select teams to send their MPS on a 2nd mission to space to show the functional utility of these accelerated disease models.

- Focused on refining tissue chip technology by creating and using multiorgan MPS to better model the whole body
- NIH selected six grants through a cooperative agreement in 2025 to be funded in two phases.



Foundational Resources



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