NIH's interest in space biomedical research

NASEM Committee on Biological and Physical Sciences in Space
March 27th 2019

Lucie Low, Ph.D.

Scientific Program Manager, NIH-NASA and HHS-NASA Liaison Coordinator

National Center for Advancing Translational Sciences

NATIONAL INSTITUTES OF HEALTH

NCI	NEI	NHLBI
NHGRI	NIA	NIAAA
NIAID	NIAMS	NIBIB
NICHD	NIDCD	NIDCR
NIDDK	NIDA	NIEHS
NIGMS	NIMH	NIMHD
NINDS	NINR	NLM
CC	CIT	CSR
FIC	NCATS	NCCIH

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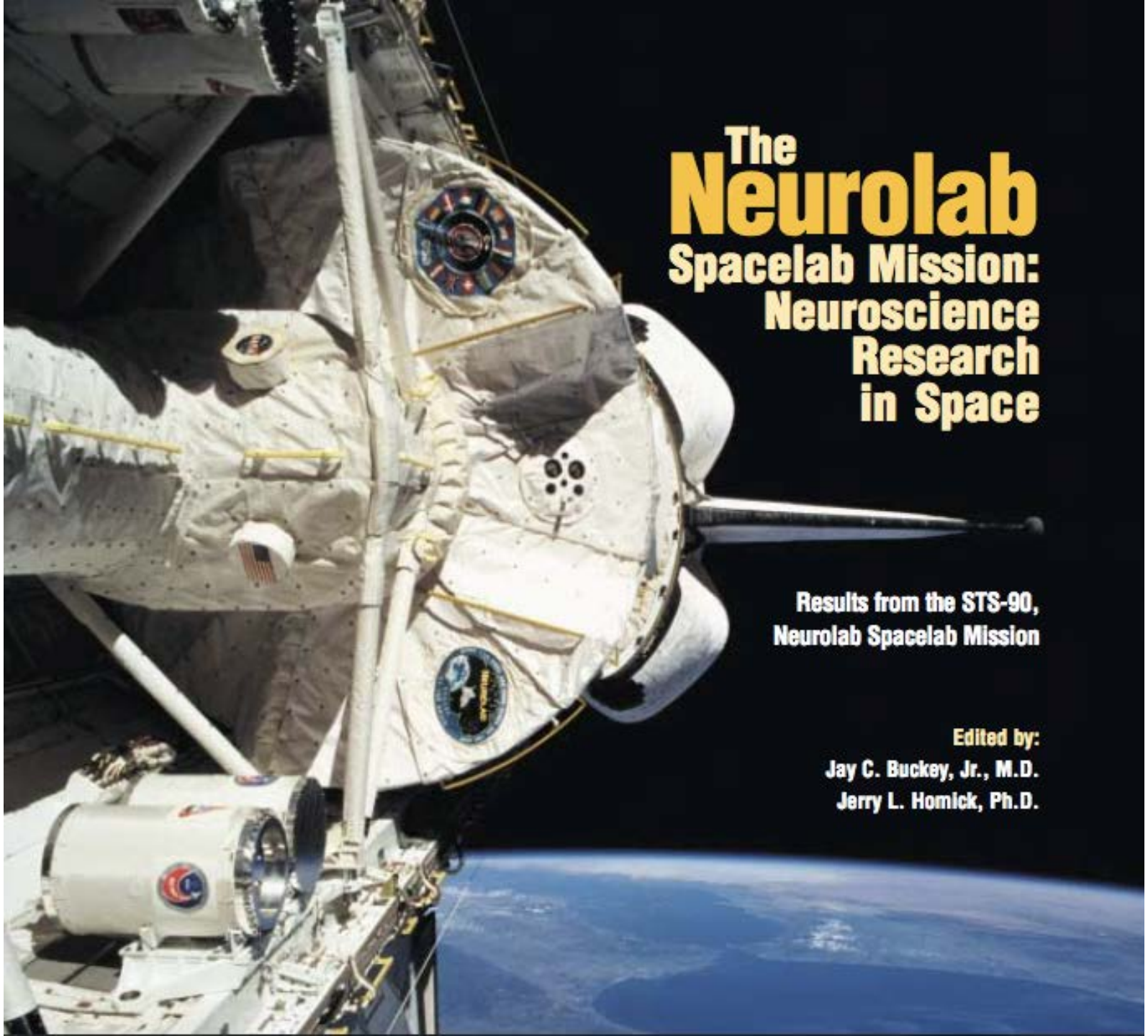

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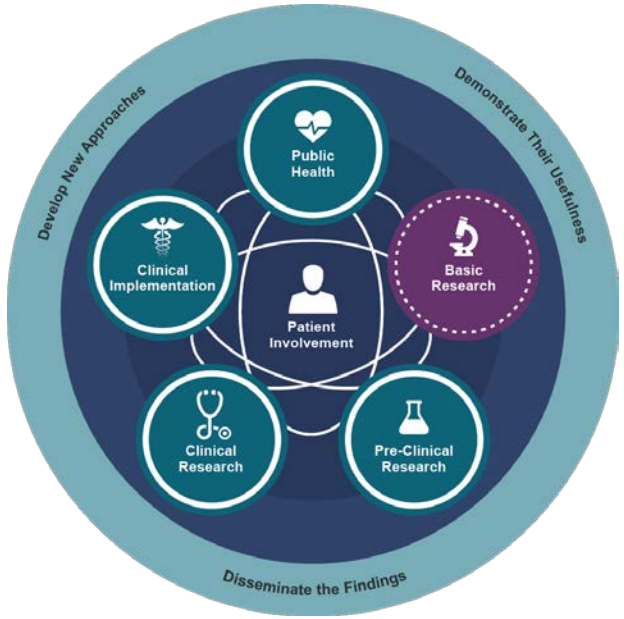
NCATS' Mission

"To catalyze the generation of innovative methods and technologies that will enhance the development, testing and implementation of diagnostics and therapeutics across a wide range of human diseases and conditions."



DEVELOP
DEMONSTRATE
DISSEMINATE

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NONREIMBURSABLE UMBRELLA INTERAGENCY AGREEMENT

between the

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
and the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FOR
COOPERATION IN RESEARCH, TECHNOLOGY, AND DEVELOPMENT ACTIVITIES
RELATED TO HUMAN HEALTH AND PUBLIC HEALTH

HHS and NASA Team Up to Explore Health on Earth and in Outer Space

December 6, 2018 | *By: Eric D. Hargan, Deputy Secretary of the Department of Health and Human Services*

Summary: The collaboration between NASA and HHS has so many exciting possibilities for understanding health issues on Earth.

HHS-NASA Interagency Agreement

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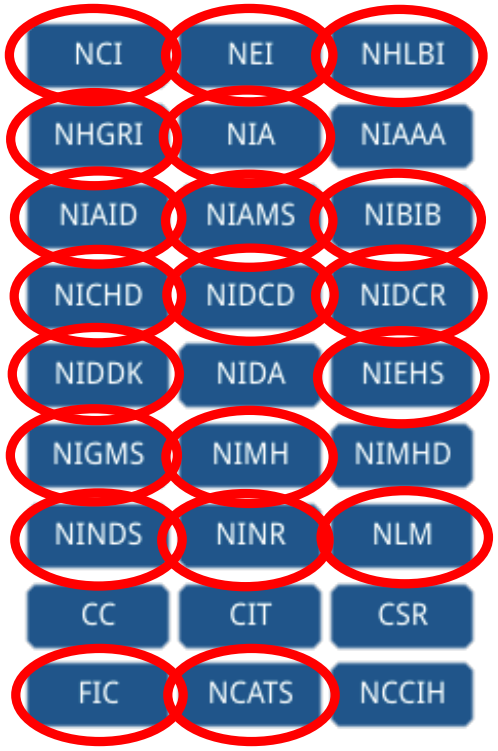
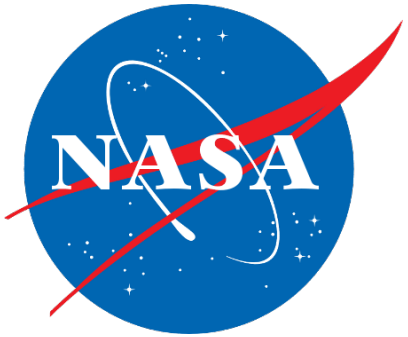
NIH-NASA Scientific Potential/Actual Collaborative Efforts Group

- NIH-led group of extramural staff, with representation from 20 Institutes and Centers at NIH.





Joint NIH and NASA activities

NIH-NASA Scientific Potential/Actual Collaborative Efforts Group

- Goals:
  - *Explore areas of potential synergy for biomedical scientific research that fulfils the mandates of both NIH and NASA.*
  - *Facilitate communications between researchers to instigate and support collaborative efforts.*
  - *Explore possibilities for joint efforts between NIH and NASA to support research into synergistic biomedical interest areas, and implement appropriate joint exercises.*

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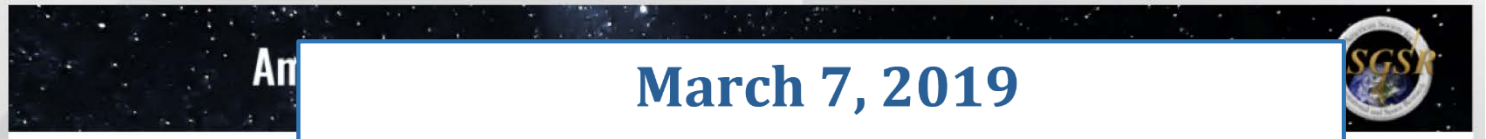
SPACE group and joint agency activities to date

- Presentations from non-NIH stakeholders
- Joint exercises



March 7, 2019

Neutron Radiobiology and Dosimetry Workshop
Presented by an Interagency Working Group

DOD/DTRA, NIAID, and NASA
8:15 am – 5:00 pm
NIAID
5601 Fishers Lane
Rockville, MD

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NCATS-NASA State-of-the-Science Meeting: 3D Tissues and Microphysiological Systems

4-5th December 2018

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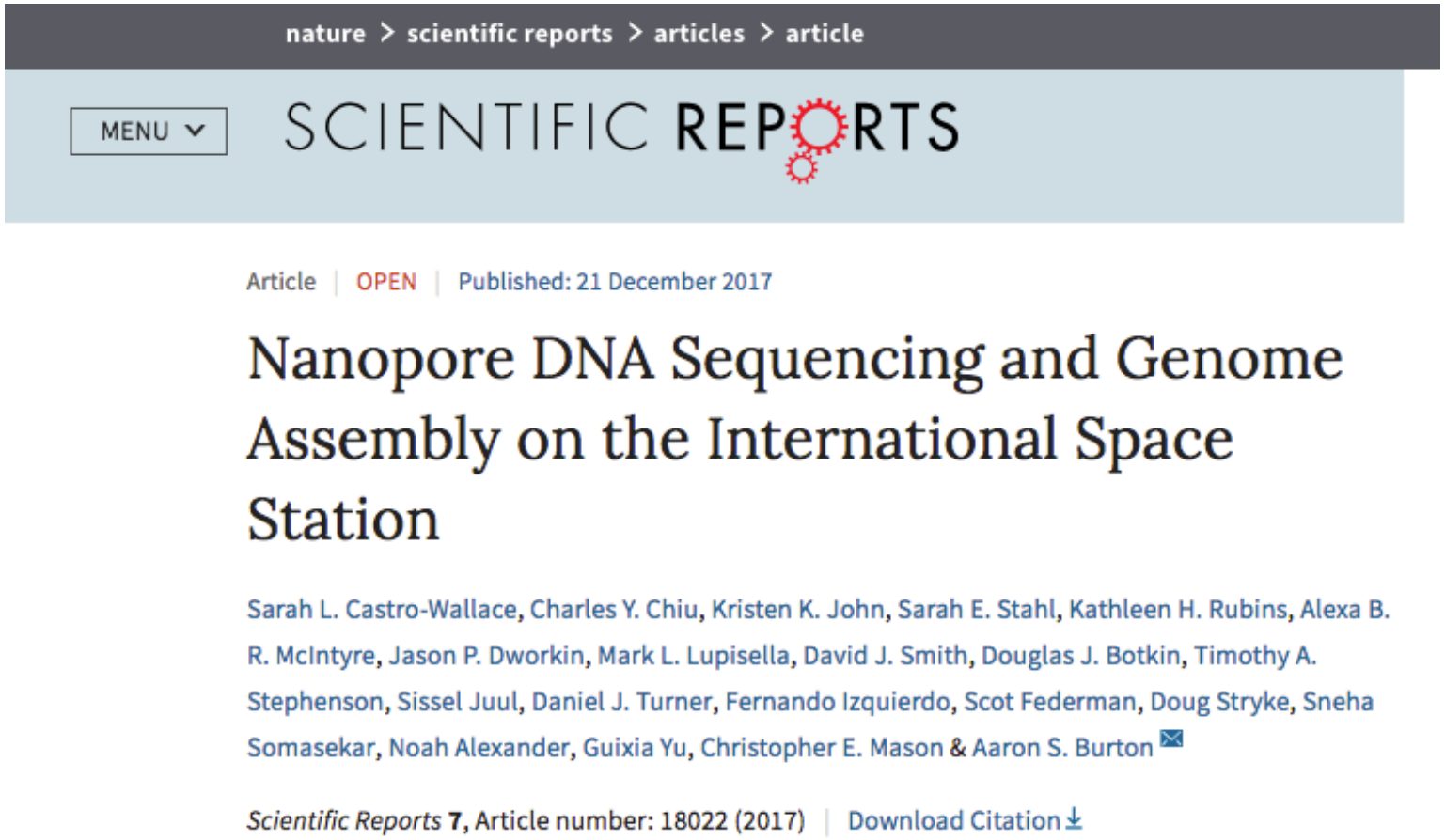

nature > scientific reports > articles > article

MENU

SCIENTIFIC REPORTS

Article | OPEN | Published: 21 December 2017

Nanopore DNA Sequencing and Genome Assembly on the International Space Station

Sarah L. Castro-Wallace, Charles Y. Chiu, Kristen K. John, Sarah E. Stahl, Kathleen H. Rubins, Alexa B. R. McIntyre, Jason P. Dworkin, Mark L. Lupisella, David J. Smith, Douglas J. Botkin, Timothy A. Stephenson, Sissel Juul, Daniel J. Turner, Fernando Izquierdo, Scot Federman, Doug Stryke, Sneha Somasekar, Noah Alexander, Guixia Yu, Christopher E. Mason & Aaron S. Burton

Scientific Reports **7**, Article number: 18022 (2017) | Download Citation

- Sequenced E. coli, bacteriophages, and mice aboard ISS
- “These findings illustrate the potential for sequencing applications including disease diagnosis, environmental monitoring, and elucidating the molecular basis for how organisms respond to spaceflight”

Funding provided by NASA, NIBIB, NIEHS, NHLBI and NIAID (amongst others)
Experiments done by Kate Rubins and Peggy Whitson on ISS

Ongoing research with NIH support

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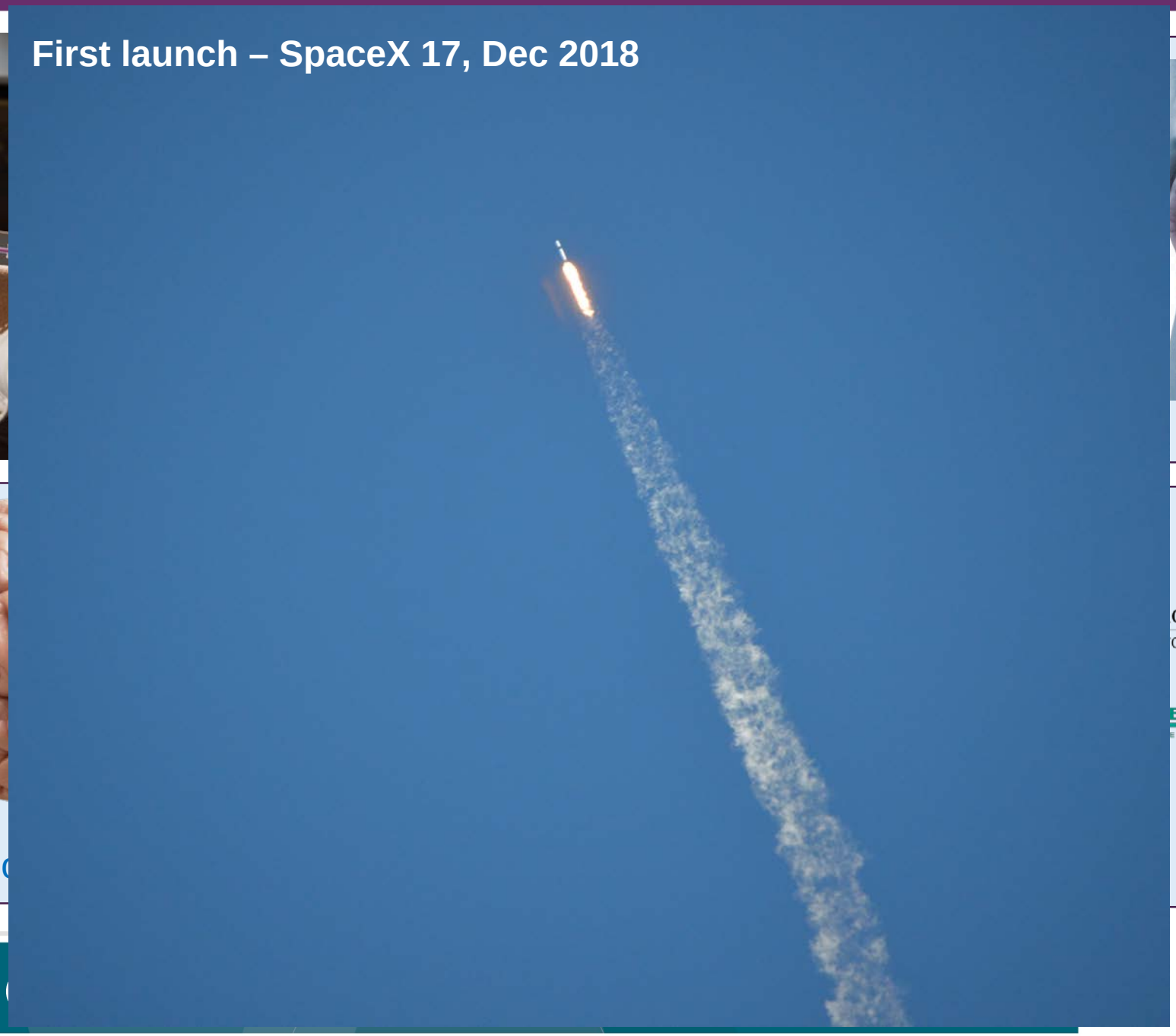
Synergistic Biomedical Research Project: NCI/NASA Collaboration at NASA Space Radiation Laboratory (NSRL), Brookhaven, NY

- Investigating radiation toxicity as a result of cancer chemotherapy
- Projects being explored:
  - Using ions heavier than hydrogen for curing “radioresistant” recurring cancers. This could also increase immunotherapy efficacy.
  - Attachment of alpha particles to antibodies for cancer subtypes, for targeted radiation-based immunotherapies.
- Phase 1 studies began December 2018

First launch – SpaceX 17, Dec 2018

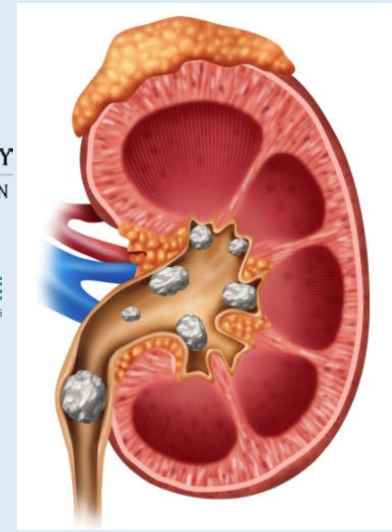


Arthritis

emulate

Space Tango

Drugs across blo



CASIS

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Pressing science questions/emerging topics

- NIH's mission is to focus on human health and disease on Earth
- NIH does not have a policy on use of low Earth orbit or deep space for space-based biomedical research
- Collaborative efforts with other agencies/partners are welcomed

- Areas of potential interest in the future:
  - Physiological changes occurring in microgravity that model certain disease/aging phenotypes
  - Mechanistic insight into basic human molecular/cellular processes using gravity vector as a variable
    - e.g. stem cell research
  - Radiation effects
  - Wearable devices/remote sensors as indicators of human health
  - Precision medicine

Thank you

Lucie.low@nih.gov

www.ncats.nih.gov/research/nasa

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