NASAfacts

Rodent Research Hardware System

Studying Animals in Space Aboard the International Space Station

The Rodent Research Hardware System provides a research platform aboard the International Space Station for long-duration rodent experiments in space. Such experiments will examine how microgravity affects the animals, providing information relevant to human spaceflight, discoveries in basic biology, and knowledge that can help treat human disease on Earth.

Rodent spaceflight experiments have contributed significantly to our understanding of the effects of microgravity on biological processes that are directly relevant to humans in space. Rodent studies provide information of the whole biological system, including the effects of microgravity on the structure and function of the sensori-motor, musculoskeletal, nervous, cardiovascular, reproductive and immune systems. Specific research questions are defined in the National Research Council's 2011 Decadal Survey Report, "Recapturing a Future for Space Exploration: Life and Physical Sciences Research for a New Era."

Historically, short-term rodent experiments have been transported into Earth's orbit aboard various vehicles, including Russian biosatellites and NASA's space shuttle. The International Space Station is the first essentially "permanent" orbiting science laboratory that offers the opportunity for longer-term experiments in space. In 2011, NASA's Ames Research Center in Moffett Field, Calif., was authorized to develop the Rodent Research Hardware System to enable rodent studies aboard the space station.

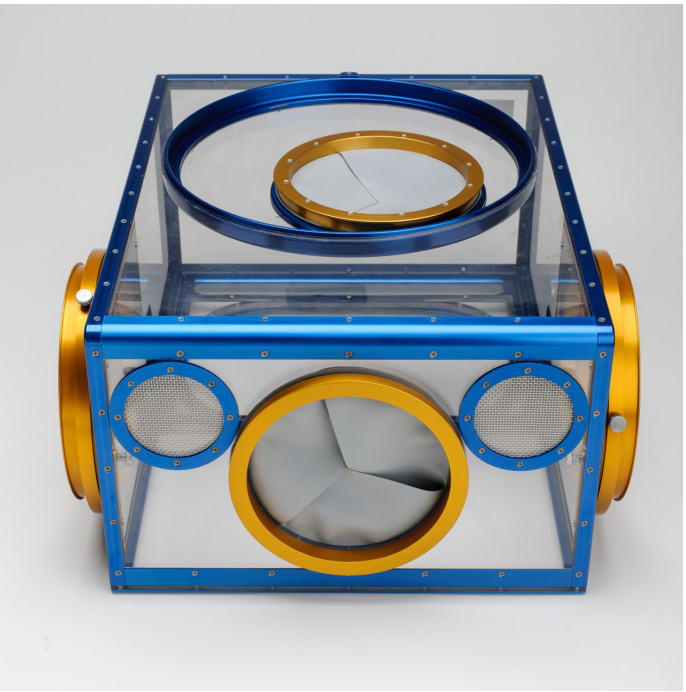
This hardware development project leverages the experience gained from 27 prior flight experiments with rodents using a space shuttle-based system. Advanced capabilities of the new system include housing for longer duration studies than the previous system permitted. In the post-shuttle era, the hardware also must support safe transport of rodents on the commercial resupply service vehicle SpaceX Dragon.

Rodent Transporter to the space station

The new system has three major components: the Transporter that will safely transport rodents from Earth to the space station; the Animal Access Unit that will be used to transfer the rodents upon arrival at the space station from the Transporter into the Habitat unit; and the Habitat that will provide long-term housing for rodents aboard the station.

Rodent Research Aboard the International Space Station

The maiden voyage of the system, Rodent Research-1, will launch on SpaceX-4 in 2014. The goal of the first flight is to validate hardware performance and for the station crew to demonstrate critical research operations on-orbit. Twenty mice will be aboard the space station for a no longer than 30 days.

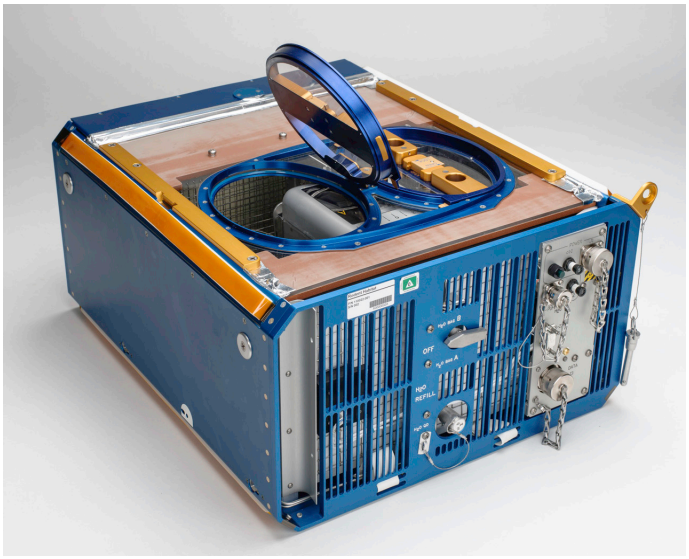


Animal Access Unit – transfer aboard the space station

NASA and the Center for the Advancement of Science in Space (CASIS) are developing space flight experiments that will use the Rodent Research Hardware System. The first science mission, Rodent Research-2, will be flown on SpaceX-6 in late 2014. Ultimately, NASA will conduct animal studies as long as six months in duration.

Under the direction of the International Space Station Utilization Office and the Space Biology Project, the Rodent Research Hardware System is being developed at Ames, benefiting from the expertise within the Space Biosciences Division. Lockheed Martin is performing hardware development and providing science and mission operations support. BioServe Space Technologies, Boulder, Colo., is developing environmental control and life support systems required during launch operations.

This project is supported by the International Space Station Program at NASA's Johnson Space Center, Houston and the Space Biology Project at Ames. Funding for Space Biology comes from the Space Life and Physical Sciences Research and Applications Division within the Human Exploration and Operations Mission Directorate at NASA Headquarters.



Rodent Habitat – housing aboard the space station

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