

Sanford-Burnham research projects selected to go to space

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This is the International Space Station, as seen from the departing Space Shuttle Discovery in 2009. Credit: NASA

Sanford-Burnham Medical Research Institute (Sanford-Burnham) today announced that two of the Institute's research teams have won Space Florida's International Space Station (ISS) Research Competition. Eight teams were selected from a pool of international applicants to send experiments to space in late 2013. The competition was initiated by Space Florida, the state's spaceport and aerospace authority, and NanoRacks, LLC. Sanford-Burnham's research will fly as payloads to the ISS aboard a SpaceX Falcon 9 launch vehicle and research will be conducted on board the U.S. National Lab at the ISS.

Using fruit flies to study space travel's effect on

astronaut cardiovascular systems

Fruit flies (*Drosophila melanogaster*) will be taken to the ISS in one experiment, led by Sanford-Burnham's Rolf Bodmer, Ph.D., and Karen Ocorr, Ph.D., Peter Lee, Ph.D., at Stanford University, and Sharmila Bhattacharya, Ph.D., at NASA Ames Research Center. These organisms are ideal for modeling [human heart](#) health. They are small, easy to care for, and their genetics are well understood. In addition, flies and humans share many of the same genetic and [molecular mechanisms](#) involved in [heart development](#) and function.

Spaceflight is well-known to have a detrimental effect on the cardiovascular system. These new *Drosophila* experiments at the ISS will increase our understanding of how spaceflight affects the cardiovascular system. Ultimately, the work could lead to countermeasures to prevent or treat [heart problems](#)—both in space and on land.



This is a fruit fly (*Drosophila melanogaster*). Credit: Sanford-Burnham Medical Research Institute

In the experiment, 16 groups of 25-30 *Drosophila* will be flown to the ISS for approximately 30 days, along with identical ground controls. The *Drosophila* will be self-sufficient, requiring no astronaut intervention during the flight. The samples will be retrieved post-flight and studied using a system for analyzing fly [heart function](#) that was developed at Sanford-Burnham.

"Understanding the effects of microgravity on heart function will be important for keeping astronauts healthy during extended stays in space. There is evidence that spaceflight results in cardiac dysfunction, including decreases in contractility, increases in cardiac arrhythmias, and alterations in cardiac cell structure, all of which affect the output of the hearts of astronauts even after they return to Earth's gravity," explained Bodmer, professor and director of the Development and Aging Program at Sanford-Burnham. "This is a once-in-a-lifetime opportunity to test our hypothesis."

Analyzing molecular processes in microgravity

Sanford-Burnham's other winning research project, led by Sanford-Burnham's Siobhan Malany, Ph.D., and Steve Vasile, Ph.D., will use—for the first time in space—plate reader technology installed on the ISS in July 2012. A plate reader is a laboratory instrument designed to detect and measure biological or chemical reactions occurring in miniaturized test tubes. On Earth, this technology is widely used in the drug discovery process to identify promising compounds that could become new treatments for disease.

In one experiment, scientists will measure fluorescence as an indication of changes in the speed of molecular rotation as an antibody binds to a vitamin called biotin. Researchers will simultaneously conduct the experiment at Sanford-Burnham to see if molecular processes are the same in space as on Earth. By transferring advanced technologies to the

ISS, researchers will one day be able to determine the effectiveness of medicines in microgravity and explore cellular pathways that can be targeted for new disease therapies.

"Nobody has ever run an experiment using a plate reader in outer space before," said Malany, chemical biology team leader in Sanford-Burnham's Conrad Prebys Center for Chemical Genomics at Lake Nona in Orlando. "Medicines may work differently in outer [space](#). Without gravity—or under significantly reduced gravity—molecular processes may differ from what we know here on Earth."

The goal of this project is to conduct initial experiments that will open the door for future advanced biology and pharmacology research in microgravity.

Provided by Sanford-Burnham Medical Research Institute

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