

Researchers to send bacteria into orbit aboard space shuttle Atlantis

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A team of researchers from Rensselaer Polytechnic Institute will send an army of microorganisms into space this week, to investigate new ways of preventing the formation and spread of biofilms, or clusters of bacteria, that could pose a threat to the health of astronauts. The Micro-2 experiment is scheduled to launch into orbit on May 14 aboard Space Shuttle Atlantis. Shown are professor and project leader Cynthia Collins (left) with graduate student Jasmine Shong making preparations for the launch of Micro-2. Credit: Rensselaer/Collins

A team of researchers from Rensselaer Polytechnic Institute will send an army of microorganisms into space this week, to investigate new ways of preventing the formation and spread of biofilms, or clusters of bacteria, that could pose a threat to the health of astronauts.

The Micro-2 experiment, led by Cynthia Collins, assistant professor in

the Department of Chemical and [Biological Engineering](#) at Rensselaer, is scheduled to launch into orbit on May 14 aboard [Space Shuttle Atlantis](#). The [microorganisms](#) will spend a week in space before returning to Earth aboard the shuttle. Within just a few hours after the shuttle's return, Collins will be able to examine the [bacteria](#) and resulting biofilms to see how their growth and development were impacted by microgravity. The samples also will be returned to Rensselaer, to be examined using the core facilities of the Institute's Center for Biotechnology and Interdisciplinary Studies.

"We know that gravity plays a key role in the development of biological systems, but we don't know exactly how a lack of gravity affects the development of bacteria and biofilms," Collins said. "This means while certain bacteria may be harmless on Earth, they could pose a health threat to astronauts on the [International Space Station](#) or, one day, long space flights. Our goal is to better understand how microgravity affects the relationship between humans and bacteria, so we can develop new ways of reduce the threat of biofilms to spacecraft and their crew."

Partnering with Collins on the Micro-2 project are nanobiotechnology expert Jonathan Dordick, the Howard P. Isermann Professor of Chemical and Biological Engineering at Rensselaer and director of the university's Center for Biotechnology and Interdisciplinary Studies, and thin films expert Joel Plawsky, professor in the Department of Chemical and Biological Engineering. NASA is funding the experiment.

Biofilms are complex, three-dimensional microbial communities. Bacteria commonly found in nature are often in the form of biofilms. Most biofilms, including those found in the human body, are harmless. Some biofilms, however, have shown to be associated with disease. Additionally, biofilms in locations such as hospitals - or confined locations like space shuttles - have exhibited resistance to antibiotics. This could pose a problem for astronauts, who have been shown to have

an increased susceptibility to infection while in microgravity.

Collins and her team will send up eight devices, called group activation packs (GAPs) and each containing 128 vials of bacteria, aboard the shuttle. While in orbit, [astronauts](#) will begin the experiment by manipulating the sealed vials and introducing the bacteria to different membranes. At the same time, Collins will perform the same actions with identical GAPs still on Earth at the Kennedy Space Center in Florida. After the shuttle returns, her team will compare the resulting biofilms to see how the behavior of bacteria and development of biofilms in microgravity differed from the control group. The experiment uses BioServe Space Technologies flight-certified hardware.

The Micro-2 research team will also test if newly developed, nanotechnology-based antimicrobial surfaces - developed by Dordick at Rensselaer - can help slow the growth of biofilms on Earth and in microgravity. If successful, these new antimicrobial surfaces could one day be used in hospitals and spacecraft to help reduce the impact of biofilms on human health.

More information: For more information on the project, visit: spacebiosciences.arc.nasa.gov/micro2.html

Provided by Rensselaer Polytechnic Institute

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