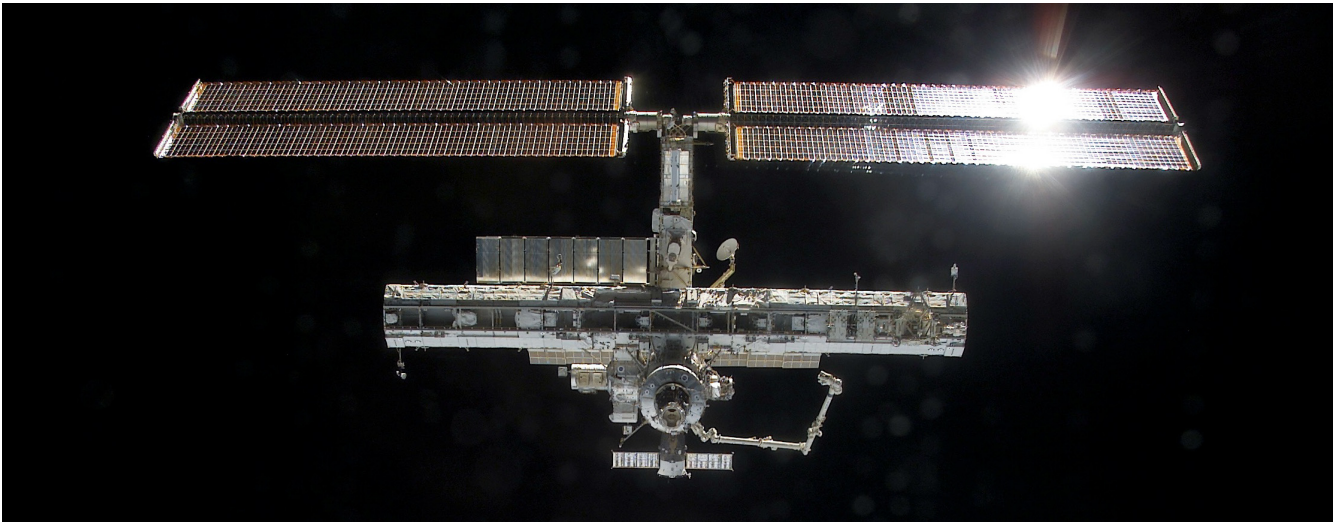


International Space Station Astronauts Connect to PowerLab for Cardiovascular Research

Colorado Springs, COLORADO, May 9 2008

Over the past twenty years, our customers have used PowerLab data acquisition systems to research how countless variables affect human physiology – including factors present in our bodies, lifestyle choices and the environment. Now, a group of Canadian researchers has moved onto the final frontier, and are using PowerLab to study how life in microgravity on the International Space Station (pictured below) affects astronaut cardiovascular and cerebrovascular physiology.



The Dizzying Effects of Space Travel

Astronauts endure many challenges while living on the International Space Station. Living in microgravity for extended time periods creates specific challenges for heart function and the blood vessels that supply an astronaut's brain. The effects of this unusual environment are often seen when astronauts complain of dizziness or even faint on return to Earth. The dangers of a sudden loss of consciousness or just concentration when trying to land a space shuttle are obvious, and NASA is concerned about future landings not just on Earth, but on Mars and the Moon.

These researchers are testing the idea that the condition is, “related to inadequate increases in peripheral vascular resistance” when astronauts land on Earth and their bodies are again subject to gravity's pull. They want to better understand the changes that occur in the cardiovascular and cerebrovascular systems in space so they can develop counter measures that will protect astronauts during future landings.

From the Space Station to PowerLab

To investigate the physiological effects of space, and develop counter measures to protect astronauts on future missions, NASA and the Canadian Space Agency are collaborating on the Cardiovascular and Cerebrovascular Control on Return from ISS experiment. Dr Richard Hughson from the University of Waterloo is leading a research team that includes collaborators from across North America and France. The experiment will use six long-duration International Space Station crewmembers as subjects (including Clay Anderson, right).



As part of the experiment, the astronaut subjects participate in a 32 minute test protocol immediately before lift-off and after touchdown. The sessions use lower body negative pressure to manipulate the astronaut's arterial and central venous blood pressure. According to researcher Dr Kevin Shoemaker, "ADInstruments equipment is used to coordinate the collection and analysis of the many variables related to the reflexive regulation of blood pressure and blood flow distribution."

The first successful post-flight session was conducted in November 2007 using Clay Anderson from International Space Station expedition 15. The researchers measured the astronaut's brain, brachial artery, and aortic blood flows, as well as arm vein pressure, arterial blood pressure, electrocardiogram (ECG), breathing rate and the amount of carbon dioxide exhaled. This information was then analyzed in conjunction with data from the pre-flight session, as well as ECG and blood pressure recordings taken on the space station.

The unpredictable nature of space travel presented the researchers with problems not faced during more conventional studies. A space shuttle's landing site depends on the weather, and cannot be decided until shortly before the shuttle re-enters the Earth's atmosphere. This means that identical labs had to be set up at the Kennedy Space Center in Florida (pictured right) as well as NASA's flight test center at the Edward's Air Force Base in Dryden California. ADInstruments helped the researchers replicate their Florida lab by providing a PowerLab data acquisition system and gas analyzer for the Dryden test site. This donation "was absolutely critical in getting us started in the very complex process of data acquisition with astronauts," says Dr Shoemaker.



Back On Earth...

The results of this study will benefit not just the lucky few who live on the space station – there are also, "strong applications to life on Earth in the context of understanding blood pressure regulation in the challenging areas of aging and physical deconditioning," say Drs. Hughson and Shoemaker. The researchers believe that finding out more about the mechanisms behind a drop in blood pressure might help reduce the incidence of fainting and falls in the elderly.

About ADInstruments

In 2008 ADInstruments is celebrating 20 years as a world-leading provider of computer-based data acquisition and analysis systems for life science research and education. Based on the PowerLab® data acquisition system with LabChart®, Scope™ and LabTutor® software, ADInstruments products record, display and analyze life science data quickly and efficiently, whether it is to speed up research projects, or to advance understanding of scientific concepts in biomedical classrooms. PowerLab systems are used in the world's best academic institutions, pharmaceutical and contract research laboratories, government organizations, and a wide range of private companies. ADInstruments has offices in the United States, Germany, the United Kingdom, Australia, New Zealand, Japan, India, China, Malaysia and Chile and in 2008 is opening offices in Brazil and Malaysia

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