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GE Researchers to Study Link Between Microgravity and Vision Impairment in Astronauts

- *Global Research awarded three-year grant to develop and test enhanced ultrasound probe and measurement techniques for NASA*
- *Study will investigate increased intracranial pressure (ICP) and its effects on the eyes*
- *Potential ground-based applications of this technology include monitoring patients with traumatic brain injuries*

NISKAYUNA, NY, July 19, 2012 – Scientists at GE Global Research will soon begin a three-year project to build and test a new ultrasound probe and measurement techniques that could eventually be used in space to monitor how the spaceflight environment affects the vision of astronauts.

The new probe, to be developed as part of this study, is smaller than what is currently on the market. It is being designed to deliver real-time, three-dimensional pictures, showing the entire globe of the eye and any potential changes in the structure and function of the eye.

“NASA’s interest is in a tool that can be used to monitor astronauts, in-flight, to watch for changes in eye structure and how the eye functions,” said Aaron Dentinger, an Electrical Engineer in the Ultrasound Systems Lab at GE Global Research. “The goal is to develop a new ultrasound probe that has the ability to take an entire volume of the eye with a single scan, providing 3-D information optimized for better image quality, and image-based measurement techniques for tracking changes in the structure and functioning of the eye.”

There have been at least seven documented cases of astronauts, with otherwise healthy eyes, returning to Earth and needing adjustments in their vision prescription. For some, the vision loss lasts only a few weeks; for others the condition persists much longer and may not resolve. One possible cause for these symptoms is elevated intracranial pressure from exposure to spaceflight.

“Spaceflight causes fluid to pool in the upper body and head resulting in increased pressure in the head and the optic nerve. That could trigger a change in the shape of the eye leading to vision problems,” said Dentinger. “So far, mild vision changes have been observed, but the potential for permanent damage is a major concern on longer term missions, making real-time monitoring in space crucial so that NASA could evaluate treatments.”

Knowledge gained from this research could also help the medical community better understand the underlying causes of traumatic brain injuries, which are a major cause of death and permanent injury worldwide. Advances in ultrasound could help lead to better monitoring of changes in pressure in the brain in those who sustain violent blows to the head, like military service members.

“ICP monitoring is very important especially when you’re dealing with patients with head trauma,” said Dentinger. “The same sort of technology we’re developing here also has potential for use on the ground to monitor ICP in the emergency room. Ultrasound has been used to look at blood flow in the brain and to the eye to predict ICP; this could be a new way to do that.”

In an agreement announced last July, GE Healthcare’s laptop-sized “Vivid q” Cardiovascular Ultrasound system was chosen by NASA to replace a 10-year-old machine aboard the International Space Station. It was delivered on NASA’s final space shuttle flight, Atlantis’s STS-135 mission, on July 8, 2011. Through this study, GE hopes to further expand the functionality of “Vivid q” as it pertains to imaging blood vessels in and around the eye.

Funding for the project totals approximately \$1.2 million, and includes a joint commitment from the National Space Biomedical Research Institute (NSBRI) and GE. Work will get underway in October.

About GE Global Research

GE Global Research is the hub of technology development for all of GE’s businesses. Our scientists and engineers redefine what’s possible, drive growth for our businesses and find answers to some of the world’s toughest problems.

We innovate 24 hours a day, with sites in Niskayuna, New York; San Ramon, California; Bangalore, India; Shanghai, China; Munich, Germany; and Rio de Janeiro, Brazil. Visit GE Global Research on the web at www.ge.com/research. Connect with our technologists at <http://edisonsdesk.com> and <http://twitter.com/edisonsdesk>.

About NSBRI

NSBRI, funded by NASA, is a consortium of institutions studying the health risks related to long-duration spaceflight and developing the medical technologies needed for long missions. NSBRI’s science, technology and education projects take place at more than 60 institutions across the United States.

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