



Scientists in Dartmouth's Toxic Metals Research Program, with colleagues at SUNY-Stony Brook, got a \$1.4-million grant to study how heavy metals move through the food web in estuaries.

Lost in space: Hearing can suffer on ISS

Who'd have thought that outer space was a noisy place? It is, at least in the International Space Station (ISS). Russian cosmonauts, who have spent the most time aboard the station so far, and a few other astronauts have suffered both temporary and permanent noise-induced hearing loss. And as space flights lengthen, hearing problems could get worse.

The space station is "not noisy at a level that you usually associate with hearing loss," says Dartmouth physician and former astronaut Jay Buckley, M.D. Buckley flew on the Space Shuttle *Columbia* in 1998 as part of the 16-day *NeuroLab STS-90* mission. Noise-induced hearing loss is typically caused by an exposure to sounds of 90 decibels or more. But the space station din is only about as loud as the inside of an airplane in flight—60 to 70 decibels.

"There are probably several factors at play," besides chronic exposure to the noise, Buckley explains. Genetic differences may play a role, with some people being more sensitive to noise than others. The slightly higher carbon dioxide levels in the ISS may also contribute. Even weightlessness, which causes a shifting of

body fluids, including increased intracranial pressure, may be partly to blame.

But before any of the reasons can be determined, there needs to be an effective hearing test that can be administered in a noisy place like the space station. Buckley, with the help of an audiologist and an engineer and funding from NASA, has developed a system that he's sure will work. He teamed up with audiologist Frank Musiek, Ph.D.—a former DMS faculty member who's now director of audiology research at the University of Connecticut-Storrs—and engineer Robert Kline-Schoder, Ph.D.—from Create, Inc., a Hanover, N.H.-based engineering and research development firm.

Probe: Musiek suggested a test that can automatically measure ear function, even in a noisy environment: an otoacoustic emissions test. The test, which is used on earth to screen newborns and some adults for hearing problems, is reliable, accurate, and objective. A small probe placed in the ear generates tones that travel to the inner ear and stimulate the hair cells in the cochlea; the hair cells send back signals that provide clues to how well the person's inner ear is working.

Buckley's team designed the test so it could be self-administered. And Kline-Schoder figured out a way to make the whole thing portable. He built miniaturized electronic components that fit into a laptop computer.

Astronauts will be tested preflight, regularly during a flight, on landing day, and several times postflight. A control group on Earth will take the same tests in a sound booth with real ISS noise (previously recorded in the space station itself) piped in. The only thing that can't be replicated is microgravity.

If all goes as planned, the testing system will fly on the ISS in 2007, says Buckley. LAURA STEPHENSON CARTER



MARK WASHBURN

Jay Buckley has designed a hearing test that can fit in a laptop computer, for use on space flights.

Age-old disparities

Elderly blacks receive fewer life-saving surgeries than whites, researchers from DMS and Harvard reported in the *New England Journal of Medicine*. The team looked at how often certain high-cost operations—such as coronary artery bypasses—were performed on Medicare enrollees from 1992 to 2001. In all 158 hospital-referral regions the

group examined, rates were higher for whites. "We found no evidence," wrote DMS's Elliott Fisher, M.D., M.P.H., and colleagues, "either nationally or locally, that efforts to eliminate racial disparities in the use of high-cost surgical procedures were successful."



Hip-huggers

Elderly patients who have elective hip replacements live longer than their counterparts. But why? Does the surgery itself make a difference? Or are patients who choose surgery healthier to begin with? A

group of DMS biostatisticians found that hip replacement patients do indeed start out healthier, with a 30% lower prevalence of most serious diseases. But even after adjusting for that fact, the life-prolonging effects of the surgery persisted. "Some effect of the procedure itself cannot be ruled out," researcher Jane Barrett, M.Sc., and her team concluded.

