



# NSBRI Explorer

National Space Biomedical Research Institute • March 2005

## Science/Medical: Ultrasound Studies on Ground and ISS

In collaboration with NASA and Wyle Laboratories, Scott Dulchavsky, M.D., Ph.D., (Henry Ford Health System) a member of the Smart Medical Systems Team, has developed training methods and interactive CD ROM refresher modules to teach ultrasound use to non-physicians, expanding clinical care capabilities in space. The techniques, tested in the microgravity environment of the KC-135, are currently being investigated on the International Space Station (ISS). These in-flight experiments and medical tasks, performed by each crew since Increment 8, show the viability of using ultrasound in space to assess physiological adaptation to space and clinical status. NSBRI also supports innovative ground-based studies of ultrasound for in-flight diagnosis of bone loss ([Dr. Yi-Xian Qin's project](#)) and therapeutics using high-intensity focused ultrasound ([Dr. Laurence A. Crum's project](#)). ♦

## Enabling Technology: Microdosimeter Measures Radiation and Assesses Risk

A rugged, portable, lightweight radiation detection instrument is under development in partnership with the faculty and midshipmen of the United States Naval Academy (USNA). The project is led by Vincent L. Pisacane, Ph.D., of the Technology Development Team. The microdosimeter instrument (MIDN) will enable real time measurement of radiation risk in space. Radiation is one of the main concerns to long-duration exploration.

MIDN will measure the three forms of space radiation – solar flares, trapped particle radiation and galactic cosmic rays. The instrument will use the measurements to directly estimate risk of damage to body tissue. MIDN's countermeasure capabilities include warning of the onset of enhanced radiation and determining safe locations during these periods. NSBRI funds also are supporting the work of USNA midshipmen working with Pisacane on a flight experiment of a preliminary version of the microdosimeter scheduled to launch September 2006 on the MidSTAR-I spacecraft. Observations from this flight will further development of MIDN. ♦

## Leaders Selected for Expanded Education Program

To better reflect the expansion of the Education and Public Outreach Program, NSBRI implemented a new leadership structure. William A. Thomson, Ph.D., (Baylor College of Medicine) has been named Education Program Leader. In this role, Thomson manages the integration of the NSBRI's Education and Public Outreach Program, which includes K-16 projects, the Postdoctoral Fellowship Program and the development phase of a Graduate Education Program in Space Life Sciences. Marlene Y. MacLeish, Ed.D., (Morehouse School of Medicine) will serve as K-16 Education Team Leader. The five K-16 projects target students from fourth grade to college and include teacher professional development, curriculum writing, community outreach and museum programs, and summer research opportunities. ♦

## NSBRI Members on NASA Strategic and Capability Road Map Committees

In taking the next steps to achieving the Vision for Space Exploration, NASA is examining and refining the concepts that will return humans to the moon and ultimately send them to Mars and beyond. Twelve strategic road-mapping committees have been established for this effort. In addition, these committees are complemented by 15 capability road-mapping committees. The committees are based on recommendations of the Presidential Commission on Moon, Mars, and Beyond, also known as the Aldridge Commission.

NSBRI is well represented on the NASA strategic and capability road map committees. Jeffrey P. Sutton, M.D., Ph.D., NSBRI Director; Charles M. Oman, Ph.D., Neurovestibular Adaptation Team Leader; and Marlene Y. MacLeish, Ed.D., K-16 Education Team Leader, are members of the ISS Strategic Roadmap Committee. MacLeish also is on the Education Strategic Roadmap Committee. Jeanne L. Becker, Ph.D., NSBRI Associate Director, serves on the Human System Technology Capability Roadmap Committee. ♦

## Recent Publications

Barger, L. K., B. E. Cade, N. T. Ayas, J. W. Cronin, B. Rosner, F. E. Speizer, and C. A. Czeisler. Extended work shifts and the risk of motor vehicle crashes among interns. *N Engl J Med* 352(2):125-34, 2005. (Human Performance Factors, Sleep and Chronobiology Team) ♦

Fincke, E. M., G. Padalka, D. Lee, M. van Holsbeeck, A. E. Sargsyan, D. R. Hamilton, D. Martin, S. L. Melton, K. McFarlin, and S. A. Dulchavsky. Evaluation of shoulder integrity in space: first report of musculoskeletal US on the International Space Station. *Radiology* 234(2):319-22, 2004. (Smart Medical Systems Team – First publication ever submitted from space) ♦

Georgakilas, A. G., P. V. Bennett, D. M. Wilson 3rd, and B. M. Sutherland. Processing of bistranded abasic DNA clusters in gamma-irradiated human hematopoietic cells. *Nucleic Acids Res* 32(18):5609-20, 2004. (Immunology, Infection and Hematology Team) ♦

Haddad, F., K. M. Baldwin, and P. A. Tesch. Pretranslational markers of contractile protein expression in human skeletal muscle: Effect of limb unloading plus resistance exercise. *J Appl Physiol* 98(1):46-52, 2005. (Muscle Alterations and Atrophy Team) ♦

Li, C. Y., C. Price, K. Delisser, P. Nasser, D. Laudier, M. Clement, K. J. Jepsen, and M. B. Schaffler. Long-term disuse osteoporosis seems less sensitive to bisphosphonate treatment than other osteoporosis. *J Bone Miner Res* 20(1):117-24, 2005. (Bone Loss Team) ♦

Sanders, L. M., C. E. Henderson, M. Y. Hong, R. Barhoumi, R. C. Burghardt, N. Wang, C. M. Spinka, R. J. Carroll, N. D. Turner, R. S. Chapkin, and J. R. Lupton. An increase in reactive oxygen species by dietary fish oil coupled with the attenuation of antioxidant defenses by dietary pectin enhances rat colonocyte apoptosis. *J Nutr* 134:3233-3238, 2004. (Nutrition, Physical Fitness and Rehabilitation Team) ♦

Taube, J. S., R. W. Stackman, J. L. Calton, and C. M. Oman. Rat head direction cell responses in 0-G parabolic flight. *J Neurophysiol* 92(5):2887-997, 2004. (Neurovestibular Adaptation Team) ♦

Wilson, T. E., and C. A. Ray. Effect of thermal stress on the vestibulosympathetic reflex in humans. *J App Physiol* 97:1367-1370, 2004. (Cardiovascular Alterations Team) ♦

## Accolades

**Kenneth M. Baldwin, Ph.D.**, Muscle Alterations Team Leader (University of California, Irvine), and **Charles M. Oman, Ph.D.**, Neurovestibular Adaptation Team Leader (Massachusetts Institute of Technology), serve on the NASA Exploration Systems Mission Directorate's Research and Technology Subcommittee. **Baldwin** is the subcommittee chair and also serves on the NASA ESMD Advisory Committee. ♦

**Jeanne L. Becker, Ph.D.**, NSBRI Associate Director, was named chair of the Women's Health Research Coalition Advisory Committee, an advocacy network of more than 600 leaders at academic medical, health and scientific institutions as well as related associations, foundation and organizations. ♦

**Joseph V. Brady, Ph.D.**, Neurobehavioral and Psychosocial Factors Associate Team Leader (Johns Hopkins University), received the Laurence R. Young Space Biomedical Research Award, the Cambridge Center Award for Distinguished Contribution to the Scientific Study of Behavior, and FASEB's Lifetime Scientific Achievement Award. ♦

NSBRI Board Member, **Michael E. DeBakey, M.D.**, (Baylor College of Medicine), was honored by the Association of American Medical Colleges for his lifetime achievement in advancing American health and health care. ♦

## Calendar Update

### NSBRI Board of Directors Meeting

March 16-17, Washington, DC ♦

### National Science Teachers Association Conference

March 31-April 3, Dallas, TX

NSBRI K-16 Education Program Activities

Contact: Kathy Major • [major@bcm.tmc.edu](mailto:major@bcm.tmc.edu) • [www.nsbri.org](http://www.nsbri.org)