



NSBRI Explorer

National Space Biomedical Research Institute • December 2009

NSBRI Delegation Visits Astronaut Center of China

In November, an NSBRI delegation visited the Astronaut Center of China (ACC) at the invitation of its director, Dr. Chen Shan-Guang. NSBRI's group included Dr. Jeffrey P. Sutton, Director; Dr. Jonathan Clark, Space Medicine Advisor; Dr. Leroy Chiao, User Panel Chair; and Dr. Scott A. Dulchavsky, Smart Medical Systems and Technology Team Member from Henry Ford Hospital.

During the visit, NSBRI toured the facilities and met with ACC leadership, key scientific personnel and taikonauts. ACC and NSBRI representatives gave presentations on achievements in space medicine and research. At the meeting's conclusion, Dr. Sutton and Dr. Chen signed a document listing areas of common interest related to space medicine and biomedical research. Themes warranting future cooperation and discussion include academic interests, scientific exchanges, and areas of potential collaboration.

During President Obama's recent state visit to China, space flight cooperation was one of many topics discussed. A joint U.S.-China statement elaborated: "The U.S. and China look forward to expanding discussions on space science cooperation and starting a dialogue on human space flight and space exploration, based on the principles of transparency, reciprocity and mutual benefit. Both sides welcomed reciprocal visits of the NASA Administrator and the appropriate Chinese counterpart in 2010." ♦

Postdoctoral Fellowships Awarded

Four new Fellows joined NSBRI's Postdoctoral Fellowship Program. As the sixth group selected for the two-year program, they will conduct independent, space-related research projects while continuing to learn from experienced research faculty mentors. ([Fellows/Project Summaries](#))

The 2009-2011 Fellows and their mentors are:

- Takuo Kubota, M.D., Ph.D., University of California, San Francisco, Mentor: Daniel D. Bikle, M.D., Ph.D.;
- Clay E. Pandorf, Ph.D., University of California, Irvine, Mentor: Kenneth M. Baldwin, Ph.D.;
- Rui Carlos Pereira de Sá, Ph.D., University of California, San Diego, Mentor: G. Kim Prisk, Ph.D.; and
- Andrew Phillips, Ph.D., Brigham and Women's Hospital, Mentor: Elizabeth B. Klerman, M.D., Ph.D.;

Fellows become members of an NSBRI research team, participating in the team's teleconferences and meetings and attending annual investigator retreats. Through these activities, they gain professional relationships with leading scientists across the country. ♦

Psychomotor Vigilance Test Advances to ISS

The Psychomotor Vigilance Test (PVT) Self Test, funded by NSBRI, advanced to a NASA flight experiment on the ISS in October. Renamed the "Reaction Self Test," the study will provide a validated measurement of in-flight cognitive performance and will help NASA characterize and quantify the risk of performance errors due to sleep loss, sleep schedule disruption, fatigue and work overload.

Through his NSBRI grants, Dr. David F. Dinges, Neurobehavioral and Psychosocial Factors Team Leader (University of Pennsylvania School of Medicine), developed, refined and evaluated the three-minute test which objectively measures processes involving attention, vigilance and reaction time. The test requires the user to watch for a visual signal and respond quickly and accurately when it appears. During three NASA Extreme Environment Mission Operations (NEEMO 9, 12 and 13) missions and at Devon Island, the PVT Self Test was performed at least four times a day – on waking, before and after simulated lunar activities, and before bed. Astronaut feedback was solicited during development of an interface component to the test that provides users with immediate feedback on their performance relative to astronaut standards.

PVT was developed through Dr. Dinges' work with NSBRI, NASA, Department of Defense, National Institutes of Health, and Department of Homeland Security. The Reaction Self Test, now supported by NASA, is currently assigned as an experiment on ISS Expeditions 19 and 20. ♦

Butterflies in Space: Bringing Space Life Science to Students

Four Painted Lady butterfly larvae on the ISS drew the attention of students and adults from across the world as they emerged as butterflies on Nov. 30 and Dec. 1.

About 100 classrooms across the U.S. participated in a pilot study by setting up ground-based habitats and replicating the space experiment. Students compared the growth and behavior of their larvae and adult butterflies with those living in the microgravity environment of space.

Nearly 2,900 additional teachers registered for and downloaded the free teacher's guide. Participating students can also compete in a [Student Science Poster Competition](#).

Photos and videos of the space experiment are available to classrooms and the public through [BioEd Online](#). Since the images are archived, classrooms can repeat the experiment in the coming years, comparing classroom larvae with photos of space larvae at the same developmental stage. The project also drew many followers via [Twitter](#) and [NSBRI's Facebook](#) page.

Sponsored by NSBRI, the project involved BioServe Space Technologies, Baylor College of Medicine, Orion's Quest, The Butterfly Pavilion, Challenger Learning Center of Colorado and NASA Office of the Chief Scientist. Additional support was provided by Houston Endowment Inc. and Howard Hughes Medical Institute. ♦

Becker Takes New Position

For the past six years, Dr. Jeanne Becker, NSBRI Associate Director, served the Institute with distinction and tireless energy. She is a stalwart and effective champion of science and education, not only for NSBRI, but for the nation's space program and beyond.

On Nov. 30, Dr. Becker left NSBRI to assume a leadership role as Associate Director of the John M. Eisenberg Clinical Decisions and Communications Science Center. The Eisenberg Center, much like NSBRI, is a competitively-awarded organization that supports a federal agency (Agency for Healthcare Research and Quality, or AHRQ) and is administered through Baylor College of Medicine.

The Center partners with AHRQ to help translate complex scientific research and outcomes data into short, plain-language materials. The information is used by clinicians, policy makers and patients to make informed decisions about health care.

NSBRI will conduct a national search to fill the Associate Director position. Dr. David A. Watson, NSBRI Senior Scientist, is serving as NSBRI Interim Associate Director. ♦

Joint NASA/NSBRI Solicitation Closes

Invited Step-2 proposals to research announcement NNJ09ZSA002N, "Research and Technology Development to Support Crew Health and Performance in Space Exploration Missions," were due Dec. 3. NSBRI solicited proposals in the areas of Cardiovascular Alterations and Smart Medical Systems and Technology. Following peer review, the funding selections are expected to be announced in April 2010. ♦

Recent Publications

Bessonova OV, Khokhlova VA, Bailey MR, Canney MS, Crum LA. Focusing of high intensity ultrasound beams and ultimate values of shock wave parameters. *Acoustical Physics*. 2009 Oct; 55(4-5): 463-473. (Smart Medical Systems and Technology Team) ♦

Brady RA, Peters BT, Bloomberg JJ. Strategies of healthy adults walking on a laterally oscillating treadmill. *Gait Posture*. 2009 Jun;29(4):645-9. (Sensorimotor Adaptation Team) ♦

Cree MG, Paddon-Jones D, Newcomer BR, Ronsen O, Aarsland A, Wolfe RR, Ferrando A. Twenty-eight-day bed rest with hypercortisolemia induces peripheral insulin resistance and increases intramuscular triglycerides. *Metabolism*. 2009 Nov 17. [Epub ahead of print] (Human Factors and Performance Team) ♦

Genc KO, Humphreys BT, Cavanagh PR. Enhanced daily load stimulus to bone in spaceflight and on Earth. *Aviat Space Environ Med*. 2009 Nov;80(11):919-26. (Musculoskeletal Alterations Team) ♦

Goel N, Rao H, Durmer JS, Dinges DF. Neurocognitive consequences of sleep deprivation. *Semin Neurol*. 2009 Sep;29(4):320-39. (Neurobehavioral and Psychosocial Factors Team) ♦

Kim JH, Bugaj L, Oh YJ, Bivalacqua TJ, Ryoo S, Soucy KG, Santhanam L, Webb A, Camara A, Sikka G, Nyhan D, Shoukas AA, Ilies M, Christianson DW, Champion HC, Berkowitz DE. Arginase inhibition restores NOS coupling and reverses endothelial dysfunction and vascular stiffness in old rats. *J Appl Physiol*. 2009 Oct;107(4):1249-57. (Cardiovascular Alterations Team) ♦

MacDougall HG, Weber KP, McGarvie LA, Halmagyi GM, Curthoys IS. The video head impulse test: Diagnostic accuracy in peripheral vestibulopathy. *Neurology*. 2009 Oct 6;73(14):1134-41. (Sensorimotor Adaptation Team) ♦

Sargsyan AE, Hamilton DR, Melton SL, Amponsah D, Marshall NE, Dulchavsky SA. Ultrasonic evaluation of pupillary light reflex. *Crit Ultrasound J*. 2009 Oct 21. [Epub ahead of print] (Smart Medical Systems and Technology Team) ♦

Swift JM, Nilsson MI, Hogan HA, Sumner LR, Bloomfield SA. Simulated resistance training during hindlimb unloading abolishes disuse bone loss and maintains muscle strength. *J Bone Miner Res*. 2009 Aug 4. [Epub ahead of print] (Musculoskeletal Alterations Team) ♦

Wambi CO, Sanzari JK, Sayers CM, Nuth M, Zhou Z, Davis J, Finnberg N, Lewis-Wambi JS, Ware JH, El-Deiry WS, Kennedy AR. Protective effects of dietary antioxidants on proton total-body irradiation-mediated hematopoietic cell and animal survival. *Radiat Res*. 2009 Aug;172(2):175-86. (Radiation Effects Team) ♦

Zhang Q, Strangman GE, Ganis G. Adaptive filtering to reduce global interference in non-invasive NIRS measures of brain activation: How well and when does it work? *Neuroimage*. 2009 Apr 15;45(3):788-94. (Neurobehavioral and Psychosocial Factors Team) ♦

Accolades

Three members of the NSBRI community were elected to the Institute of Medicine (IOM) in October. Election to the IOM is considered one of the highest honors in the fields of health and medicine and recognizes individuals who have demonstrated outstanding professional achievement and commitment to service. Congratulations to **Dr. Joanne Lupton**, NSBRI Graduate Education Program Principal Investigator and former NSBRI Team Leader (Texas A&M University), **Dr. Mark S. Humayun**, NSBRI Board of Scientific Counselors (University of Southern California, Los Angeles), and **Dr. Alfred L. Goldberg**, former NSBRI Associate Team Leader (Harvard Medical School). ♦

Calendar Update

NASA/NSBRI Human Research Program Investigators' Workshop, February 3-5, Houston ♦