



# NSBRI Explorer

National Space Biomedical Research Institute • January 2009

## Ultrasound for Bone Assessment and Fracture Healing

An ultrasound technology under development will be a valuable tool for early prediction of bone loss and bone quality as well as for guided acceleration of fracture healing. The project, led by Yi-Xian Qin, Ph.D., Smart Medical Systems and Technology Associate Team Leader (Stony Brook University), involves the development of a combined diagnostic and treatment ultrasound technology that uses non-invasive scanning confocal acoustic diagnostic imaging and low-intensity pulsed ultrasound. This approach will be important for astronaut health care due to the risk of musculoskeletal disorders and will provide the needed bone imaging capabilities in space. The device is small, easy-to-use and portable.

Qin has been working on this technology for NSBRI since 2001. The diagnostic portion of the device, which analyzes bone mineral density and bone strength, is currently in clinical trials. Funding for the therapeutic portion of the project began in November.

On Earth, the device will allow physicians to monitor osteoporosis patients for the risk of fractures with detailed images and to use the ultrasonic treatment to help accelerate fracture healing. The new technology costs could be as much as 10 times less than the costs associated with X-ray evaluations. ♦

## Podcasts Communicate Science and Technology Achievements

Twelve NSBRI podcasts produced by EarthSky Communications debuted in the fall, establishing a highly successful method of informing the public about research advances. Six Team Leaders and Investigators were interviewed to create the 90-second and 8-minute podcasts. ([Podcasts](#))

The short pieces aired on EarthSky's 1,700+ broadcast outlets in their global network, which includes Voice of America and World Radio Network. The short and long podcasts are also accessible on the EarthSky Web site.

The Education Program supplemented the effort with [Podcasts Plus Lessons](#). Posted on the NSBRI and BioEd Online Web sites, this resource provides teachers with the podcasts, plus related lessons and activities to download for classroom use. ♦

## Postdoctoral Fellowships Awarded, Program Expanded

NSBRI expanded its Postdoctoral Fellowship Program by accepting four Fellows into the 2008-2010 program. The Fellows and their mentors are:

- Ronke M. Olabisi, Ph.D., Rice University, Mentor: Jennifer L. West, Ph.D.;
- Richard B. Souza, Ph.D., University of California, San Francisco, Mentor: Sharmila Majumdar, Ph.D.;
- Daniela Trani, Ph.D., Georgetown University, Mentor: Albert J. Fornace, Jr., M.D.; and
- Bertrand P. Tseng, M.D., Ph.D., University of California, Irvine, Mentor: Charles L. Limoli, Ph.D.

Fellows become part 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.

As the fifth group selected for the two-year program, they will conduct independent, space-related research projects while continuing to learn from an experienced research faculty mentor.

Since its inception in 2004, 17 Fellows have been selected – 7 women and 10 men, representing universities in 8 states and the District of Columbia. Fellows who have completed the program continue to receive excellent offers of faculty positions at universities and research institutes. ♦

## NSBRI Launches Facebook Page

NSBRI entered the world of social media with the launch of a page on the popular Web site, [Facebook](#). The page will be updated periodically with NSBRI news, photos, events and links to external NSBRI-related stories, videos or podcasts. The Facebook page will allow NSBRI to promote its science, technology, and education and outreach efforts to an audience that includes a high percentage of college students. In addition to getting the word out about NSBRI, this low-cost, social media approach will be used as an additional tool to recruit applicants for the Summer Internship, Graduate Education and Postdoctoral Fellowship Programs. ♦

## Council Commends Team Realignment

The External Advisory Council (EAC) met in December to hear detailed status reports from the new Team Leadership of NSBRI's realigned science and technology teams. The EAC, made up of leaders in research fields central to NSBRI's mission, is responsible for advising Institute management on strategic issues and programmatic effectiveness.

The EAC, led by Stephen B. Doty, Ph.D. (Hospital for Special Surgery, New York) provided feedback on the team realignment and commended the Institute on implementation of the Council's recommendations. Doty noted NSBRI's programs are well aligned with high-priority strategic needs of NASA and that NSBRI and NASA programs complement each other well.

NASA managers leading the Human Research Program (HRP) also attended the meeting. "A tight linkage between NSBRI team leadership and HRP's element scientists is fundamental to using our limited resources to accomplish the greatest benefit for NASA's exploration goals," said John B. Charles, Ph.D., Program Scientist, NASA Human Research Program and NSBRI Contracting Officer's Technical Representative. ♦

## Recent Publications

Allen DL, Bandstra ER, Harrison BC, Thorng S, Stodieck LS, Kostenuik PJ, Morony S, Lacey DL, Hammond TG, Leinwand LL, Argraves WS, Bateman TA, Barth JL. Effects of spaceflight on murine skeletal muscle gene expression. *J Appl Physiol*. 2008 Dec 12. [Epub] (Musculoskeletal Alterations Team) ♦

Brainard GC, Sliney D, Hanifin JP, Glickman G, Byrne B, Greeson JM, Jasser S, Gerner E, Rollag MD. Sensitivity of the human circadian system to short-wavelength (420-nm) light. *J Biol Rhythms*. 2008 Oct;23(5):379-86. (Human Factors and Performance Team) ♦

Buccello-Stout RR, Bloomberg JJ, Cohen HS, Whorton EB, Weaver GD, Cromwell RL. Effects of sensorimotor adaptation training on functional mobility in older adults. *J Gerontol B Psychol Sci Soc Sci*. 2008 Sep;63(5):P295-300. (Sensorimotor Adaptation Team) ♦

Canney MS, Bailey MR, Crum LA, Khokhlova VA, Sapozhnikov OA. Acoustic characterization of high intensity focused ultrasound fields: A combined measurement and modeling approach. *J Acoust Soc Am*. 2008 Oct;124(4):2406-20. (Smart Medical Systems and Technology Team) ♦

Hienz RD, Brady JV, Hursh SR, Gasior ED, Spence KR, Emurian HH. Effects of incentives on psychosocial performances in simulated space-dwelling groups. *Acta Astronaut*. 2008 Oct-Nov;63(7-10):800-10. (Neurobehavioral and Psychosocial Factors Team) ♦

Khaled S, Gupta KB, Wu X, Yu T, Chang P, Kucik DF. Iron ion irradiation alters adhesiveness of vascular endothelium. *Gravit Space Bio Bulletin*. 2008 June; 21(2):25-26. (Cardiovascular Alterations Team) ♦

MacLeish MY, Thomson WA, Morens N, Smith RB, Houston CW, Sognier M, Coulter G, Vogt GL. Education for the journey to the moon, Mars, and beyond. *Acta Astronaut*. 2008 Oct-Nov;63(7-10):1158-67. (Education Program) ♦

MacNeillage PR, Ganesan N, Angelaki DE. Computational approaches to spatial orientation: From transfer functions to dynamic Bayesian inference. *J Neurophysiol*. 2008 Dec;100(6):2981-96. (Post-doctoral Fellow – Sensorimotor Adaptation Team) ♦

Qin YX, Lam H. Intramedullary pressure and matrix strain induced by oscillatory skeletal muscle stimulation and its potential in adaptation. *J Biomech*. 2009 Jan 19;42(2):140-5. (Smart Medical Systems and Technology Team) ♦

Santhi N, Aeschbach D, Horowitz TS, Czeisler CA. The impact of sleep timing and bright light exposure on attentional impairment during night work. *J Biol Rhythms*. 2008 Aug;23(4):341-52. (Human Factors and Performance Team) ♦

Taddei PJ, Zhao Z, Borak TB. A comparison of the measured responses of a tissue-equivalent proportional counter to high energy heavy (HZE) particles and those simulated using the Geant4 Monte Carlo code. *Radiat Meas*. 2008 Oct-Nov;43(9-10):1498-1505 (Radiation Effects Team)

## Calendar Update

NASA/NSBRI Human Research Program Investigators' Workshop  
February 2-4, League City, TX

NSBRI External Advisory Council Meeting  
March 2, Houston

NSBRI Board of Directors Meeting  
March 24, Washington, DC ♦

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