



# NSBRI Explorer

National Space Biomedical Research Institute • October 2005

## Space Medicine and Health Care Systems Collaborations

NSBRI is working closely with NASA Johnson Space Center's Office of Space Medicine and Health Care Systems leadership, including Mike Duncan, M.D., J. D. Polk, D.O., and Kathy Johnson-Throop, Ph.D., to optimize the Institute's countermeasure and technology development program for high-priority operational needs of NASA. Several collaborative projects have resulted, including one involving the development of standards for fitness of duty. The project will define acceptable limits for human health during space flight through a series of seven discipline expert workshops.

Another space medicine project addresses risk model development for human exploration medical capabilities. The medical database and bioinformatics activity will result in development of an accurate model to determine human risk as it pertains to bone, muscle and exercise parameters and a risk model to advance technology for exploration medicine. ♦

## NSBRI Science/Technology Portfolio Partners with Industry

More than 30 companies are affiliated with projects in NSBRI's science and technology portfolio. These companies represent several industry sectors – biomedical devices, pharmaceuticals, engineering, technology and human performance. Industry partner participation varies by project but ranges from supply of material, labor, technology, design, information or funding.

As new members are added to the Institute's Industry Forum, member companies will reflect the depth and breadth of the academic/industry collaborations already active in the NSBRI program. These industry collaborations enhance NSBRI's countermeasure development for space exploration and serve to expedite Earth spin-offs and commercial opportunities. ♦

## Identifying Multisystem Effect of Exercise Training/Nutritional Support

Based on data from highly trained athletes and previous bed-rest simulations, Benjamin D. Levine, M.D., Cardiovascular Alterations Team (University of Texas Southwestern Medical Center), is examining whether an integrative countermeasure will be effective against cardiovascular deconditioning, skeletal muscle atrophy and bone demineralization.

The bed-rest study examines the combination of rowing, strength training and a nutritional supplement (potassium-magnesium-citrate) as a single integrated countermeasure that can be applied in a practical fashion aboard the International Space Station or during lunar exploration-class missions. ♦

## NSBRI/NASA Connect™ Program on Sleep and Circadian Rhythm

NSBRI's third educational television collaboration with NASA Connect™ aired on September 22. Charles Czeisler, Ph.D., M.D., Human Performance Factors, Sleep and Chronobiology Team Leader (Harvard Medical School), served as the content expert for *The Right Ratio of Rest* script and appeared in the program.

The segment also featured activities based on NSBRI's Sleep and Daily Rhythms teacher activity guide produced by Baylor College of Medicine's NSBRI Education and Outreach Team members.

NASA Connect™, a series of free, integrated math, science, and technology programs for grades 6-8, airs on PBS and NASA TV and is available on DVD and the [NASA Connect™ Website](#). ♦

## Kovacs to Lead External Advisory Council

Gregory T. Kovacs, M.D., Ph.D., (Stanford University School of Medicine) has been selected as Chairman of the Institute's External Advisory Council. The Council provides advice to Institute management concerning programmatic relevance and effectiveness. Kovacs replaces Lawrence A. Palinkas, PhD., (University of Southern California) who is stepping down after five years of excellent service. ♦

## Meeting Addresses Individual Differences in Space Flight

A bioastronautics meeting entitled "Tailoring Countermeasures to Individual Astronaut Needs: Dealing with Individual Variability and Differential Vulnerability to Health and Behavior Risks in Prolonged Space Flight" took place on October 11 at the University of Pennsylvania School of Medicine in Philadelphia. Sponsored by NSBRI, the meeting brought together representatives from all NSBRI science and technology teams, NASA Headquarters and various NASA Centers, as well as biostatisticians from NASA Johnson Space Center, Massachusetts Institute of Technology and the University of Pennsylvania. David F. Dinges, Ph.D., Neuro-behavioral and Psychosocial Factors Team Leader (University of Pennsylvania School of Medicine), coordinated the activity.

The conference examined the need to focus on the range of individual responses to space flight risks and responses to the countermeasures for differential vulnerability to space flight risks. The meeting objective was to ensure that countermeasure development can effectively progress to meet the needs of every astronaut, not simply the "average" astronaut. ♦

## Recent Publications

Bailey, M. R., Y. A. Pishchalnikov, O. A. Sapozhnikov, R. O. Cleveland, J. A. McAteer, N. A. Miller, I. V. Pishchalnikova, B. A. Connors, L. A. Crum, and A. P. Evan. Cavitation detection during shock-wave lithotripsy. *Ultrasound Med Biol* 31(9):1245-56, 2005. (Smart Medical Systems Team) ♦

Fiedler, E. R. Operational processes and cognitive mapping. *Aviat Space Environ Med* 76(7 Suppl):C4-6, 2005. (NSBRI/NASA Behavioral Health Liaison) ♦

Lafon, C., V. Zderic, M. L. Noble, J. C. Yuen, P. J. Kaczkowski, O. A. Sapozhnikov, F. Chavrier, L. A. Crum, and S. Vaezy. Gel phantom for use in high-intensity focused ultrasound dosimetry. *Ultrasound Med Biol*, 31(10):1383-89, 2005. (Smart Medical Systems Team and Postdoctoral Fellow) ♦

Li, C. Y., R. J. Majeska, D. M. Laudier, R. Mann, and M. B. Schaffler. High-dose risedronate treatment partially preserves cancellous bone mass and microarchitecture during long-term disuse. *Bone* 37(3):287-95, 2005. (Bone Loss Team) ♦

Moreno, N. P., J. K. Roberts, B. Z. Tharp, J. P. Denk, P. H. Cutler, and W. A. Thomson. Increasing student learning through space life sciences education. *Acta Astronaut* 56(9-12):783-91, 2005. (Education and Outreach Team) ♦

Peterson, N. C., M. D. Servinsky, A. Christian, Z. Peng, W. Qiu, J. Mann, J. Dicello, and D. L. Huso. Tamoxifen resistance and Her2/neu expression in an aged, irradiated rat breast carcinoma model. *Carcinogenesis* 26(9):1542-52, 2005. (Radiation Effects Program) ♦

Xia, Y., W. Lin, and Y-X. Qin. The influence of cortical end-plate on broadband ultrasound attenuation measurements at the human calcaneus using scanning confocal ultrasound. *J Acoust Soc Am*, 118(3), Part 1:1801-1807, 2005. (Technology Development Team) ♦

Zeitzer, J. M., S. B. Khalsa, D. B. Boivin, J. F. Duffy, T. L. Shanahan, R. E. Kronauer, and C. A. Czeisler. Temporal dynamics of late night photic stimulation of the human circadian timing system. *Am J Physiol Regul Integr Comp Physiol* 289(3):R839-R844, 2005. (Human Performance Factors, Sleep and Chronobiology Team) ♦

Zwart, S. R., J. E. Davis-Street, D. Paddon-Jones, A. A. Ferrando, R. R. Wolfe, and S. M. Smith. Amino acid supplementation alters bone metabolism during simulated weightlessness. *J Appl Physiol* 99(1):134-40, 2005. (Nutrition, Physical Fitness and Rehabilitation Team) ♦

## Calendar Update

### NSBRI Board of Directors Telecon

November 9, 2 p.m. Central

### Vitamin D and Bone Health: *An Update from Earth and Outer Space*

November 15, 9 a.m. – Noon Eastern

Jack Morton Auditorium, George Washington University, Washington, D.C.

[Symposium Web Site](#)

### NSBRI Investigator Retreat

February 27 – March 1, 2006

South Shore Harbour Conference Center  
League City, Texas ♦