SPACE BIOMEDICINE

An Rx for Astronauts

The new director of the National Space Biomedical Research Institute hopes to strengthen a NASA experiment in improving the health of U.S. astronauts during and after long flights

BOSTON—Keeping astronauts healthy is no easy task. Bone and muscle loss, crippling nausea, disorientation, and low blood pressure are just some of the threats they face from long-duration flights. While researchers struggle to understand and counter these problems, tight budgets, limited experiment time in space, and the field's shaky scientific reputation make their job even tougher. But for Jeffrey Sutton, a 43-year-old neuroscientist at Massachusetts General Hospital in Boston, the challenge is worth abandoning a successful career in academia and braving Texas's sweltering summers.

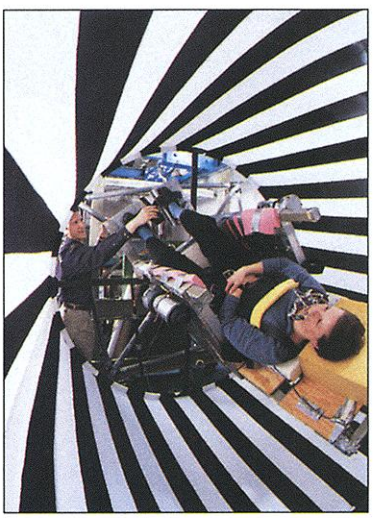
Next month Sutton takes over as the first onsite director of the fledgling National Space Biomedical Research Institute (NSBRI) in Houston. NSBRI is a consortium of U.S. universities and medical centers funded by NASA to carry out research on human space exploration. Created in 1997, it has grown to a $25.5-million-a-year operation, with a dozen academic partners and a portfolio of 90 research projects.

Sutton is an outsider in a field dominated by a small and aging cadre of researchers. He hopes to use his eclectic background in medicine, brain research, and theoretical physics to help the institute produce a range of space-related drugs and devices and attract a new generation of top-notch investigators. The appointment of the Canadian-born Sutton is seen as a coming of age for a field hobbled by the perception of parochialism and a dearth of excellent research. "He's young, well respected, and enthusiastic—and he's not part of the space mafia," says Laurence Young, an astronautics professor at the Massachusetts Institute of Technology (MIT) who is stepping down as founding director.

Sutton says the new job will give him the chance to meld medical research and advanced technology in a setting more dynamic and collaborative than most academic laboratories. But his welcome has been less than hospitable: Within weeks of his appointment in November, NASA surprised him by paring $3.4 million from his budget. That news came amid budget-related delays in the construction of the international space station and a leadership vacuum at NASA, where both the biological and physical sciences office and the life sciences division at NASA headquarters remain without a permanent head.

Sutton says NASA will remain the institute's primary funder, although he hopes to attract significant support from small, nimble companies and a defense establishment eager to capitalize on new applications that could revolutionize intensive care units and field hospitals on Earth. And he's betting that the organization's streamlined management structure will make it "a poster child" for an economy-minded Bush Administration.

Eyewitness. Jeffrey Sutton takes over at NSBRI, where researchers evaluate inner ear function by monitoring the eye's response to moving stripes.



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Sutton jokes that his academic training "is the reverse of the American dream—from riches to rags." He began with a medical degree from the University of Toronto in 1982, then moonlighted in the emergency room while studying for a master's degree in neuroscience and a Ph.D. in theoretical physics. He says the doctorate gave him a deeper understanding of the connections between physics and neuroscience, which he pursued at Harvard Medical School. He also worked with a brain-mapping group at Harvard's Mass General before founding the neural systems group.

His first contact with the space field came in 1999 at an NSBRI workshop on smart medical systems. Institute leaders offered him the job of team leader, and, although he remained based in Boston, he later took over the advanced technology team as well. After an unsuccessful nationwide search following Young's decision to step down, the institute's board set its sights on Sutton. They invited him to dine with astronauts and took his two sons, ages 7 and 9, to a major league baseball game. The institute's collaborative culture, he says, was a far cry from the "malignant narcissism" that dominates MIT and Harvard.

The institute follows the National Institutes of Health model of peer review. But rather than exploring basic biomedical questions, the projects are linked to real-world problems such as bone loss, infection, and muscle atrophy, as well as an improved response to medical emergencies. For example, one team is testing bloodless surgery techniques using high-intensity focused ultrasound, while another is developing a sensor that can measure skin-cell tissue pH without breaking the skin. A group has recently been formed to examine the neurobiological and psychosocial factors of space flight, breaking a NASA taboo against probing the mental health of astronauts.

To support these and other projects, Sutton hopes to quadruple the institute's budget over time. "We need more money," he says, "but not necessarily from NASA." So far, however, Sutton says the institute's efforts to create an industry forum have been a flop. "It's not even 'Do Not Resuscitate.' [The patient] has yet to be awake." There are also problems with the current allocation system, he says, which is based on "a socialist model" of equitable portions to all. The institute, he adds, is tainted by "a false perception of cronyism, of good old boys feeding off NASA's trough." He also hopes to give team leaders greater autonomy to set their research agendas.

Sutton's job has been made more difficult by cuts in the space station budget that, at least for the time being, will limit the number of astronauts on board and the time available to conduct experiments. With only 10 to 20 hours of crew time a week, says Young, "the science will be disappointingly small." And other institute advisers say they worry that the new director may become ensnared in NASA's tangled politics.

But Sutton says that the institute itself presents an interesting experiment. "There are no others I know that are run this way, with industry, government, and academia working together, and with proposals passing strict peer review," he says. Win or lose, his attempts to reshape the institute and the field of space biomedicine will be reviewed carefully by his peers.

—ANDREW LAWLER