Helping to Put a Man on Mars

Pennington Center study identifies possible therapies that may prevent the muscle and bone damage produced by long-term space flight.

Research completed last year at the Pennington Center may one day play a key role in helping astronauts venture to Mars and return home safely. Through support from the National Aeronautics and Space Administration, the Pennington Center made significant strides in understanding how to protect astronauts from the bone and muscle damage that results from extended space flights.

In addition to developing a new model to study the effects of weightlessness on the body, the Pennington Center identified a pharmaceutical and a hormone supplement that researchers believe may be effective in preventing damage to muscle and bone.

Bone and muscle loss is a problem for astronauts because the lack of gravity in outer space does not provide the constant force that keeps muscles and bones healthy. NASA is seeking to address this issue as it plans longer space missions, including construction of a permanent space station and a flight to Mars.

Dr. Steve Smith, a Pennington Center endocrinologist who worked on the project, says the bone and muscle loss doesn’t slow astronauts a bit while in space. The damage shows up once they’re back on Earth. “The human body adapts very well. But the longer you’re up there, the greater the risk of permanent impairment when you’re back home.”

To find ways to make the transition easier, the Pennington Center assessed various therapies in 48 volunteers over a three-year period. To simulate the effect of weightlessness on the body, volunteers were kept at bed rest for four weeks. Additionally, their feet were elevated approximately six degrees higher than their heads.

This kept the participant from using his or her major bones and muscles. By elevating the feet higher than the head, body fluids tend to concentrate toward the upper body, similar to what occurs in space.

The first step was to test a model for bed rest studies developed by Dr. George Bray, Executive Director of the Pennington Center. Previous bed rest studies were based on a 17-week test period. Bray believed the time could be shortened by using a hormone to accelerate the bone and muscle loss that is produced by immobilization.

The model worked, which has implications not only for NASA and their studies of the effects of space flight, but for other studies of pharmaceuticals and the effects of nutrition and exercise, as well.

“It’s difficult to find people who are willing to lay down for four weeks, but it’s really hard to get people to lay down for 17,” says Dr. Smith. “And that’s not to mention the cost of performing a study for that long of a period.”

Once the new model was refined, several therapies were tested. Two were effective, while results of a third are not finalized.

Injections of testosterone were found to prevent the loss of protein that affects both muscles and bones during weightlessness. This is significant because muscles are made predominantly of protein. This means that if protein is lost, muscle is lost along with it.

But Smith and his colleagues were disappointed to learn that even when the muscle itself was preserved through the use of testosterone, the muscles were still weaker at the end of the study period.

“It taught us that it’s not just the loss of muscle, but something about the function of the muscle that changes with immobilization,” says Smith. “The amount of muscle and the function of the muscle are obviously very tightly linked. This gives us some clues as to which directions we need to move to better preserve muscle function.”

The second therapy tested is a drug called alendronate which is used to treat osteoporosis. This drug prevents the breakdown of bone by inhibiting the cells that “chew up” the bone. The drug prevented the calcium and bone loss that normally occurs through immobilization.

Just as interesting to Smith and his fellow researchers, the study showed that one third... continued on page 5

Risky Business: The lack of gravity in outer space means this astronaut might discover physical problems after he returns home.
Poised to Exploit the Opportunities of a New Era

The basic science component of the Pennington Biomedical Research Center's research program continues to expand with the acquisition of additional funding and recruitment of new faculty.

We are extremely pleased with the addition of Dr. Leslie Kozak to our faculty through his appointment to the Claude Bernard Chair in Molecular Nutrition. Prior to joining the Pennington Center, Dr. Kozak was at the Jackson Laboratory in Maine for 29 years.

He is internationally recognized for his use of transgenic approaches to study the function of genes that affect the regulation of body weight. The field of transgenics involves artificially introducing or removing a gene from a laboratory animal to study the gene’s effects.

In addition to bringing a substantial research group and grant support with him, Dr. Kozak’s considerable research skills and knowledge will be of great benefit to our other scientists. Dr. Kozak will also work closely with Dr. Randall Mays, who came to the Pennington Center last year from Oak Ridge National Laboratory in Tennessee, on the continued expansion of our transgenic facility and its use as a scientific resource for the region.

The use of molecular approaches to understanding nutrition has provided a major impetus to studying how nutrients regulate metabolism and, conversely, how genes influence the interaction between diet and disease. This information provides exciting new opportunities for the development of new drugs to treat diseases associated with Western diets.

Not surprisingly, the pharmaceutical industry has demonstrated keen interest in this area. Unfortunately, this interest has led to the departure of Dr. David West, one of our senior scientists, to Parke Davis Inc. in California. We recognize that if the Pennington Center is to continue to be at the forefront of research in molecular nutrition, our faculty will be targets for the private sector and other institutions. We must do everything possible to provide the intellectual, scientific, and financial environment necessary to retain them.

While we are disappointed with the departure of Dr. West, we believe the successful recruitment of Dr. Kozak indicates that we are competitive and offer an attractive opportunity for a top scientist to further his or her career. Reflecting the quality of our faculty, several of our scientists have received or are scheduled to receive international awards this year.

Dr. William Harsel was presented the Pharmacology and Upjohn Award for lifetime contributions to research in domestic rabbits in August. Dr. Harsel is one of the most outstanding scientists in his field, and has made numerous seminal contributions to reproductive endocrinology.

While Dr. Harsel continues his innovative research program, his experience is a major asset. He is an outstanding mentor to our younger scientists and a valued advisor and colleague to the senior staff.

Last year, Dr. Timothy Gilbertson was presented the Ajinomoto prize for outstanding young scientist of the year by the International Association for the Chemosensories. Dr. Gilbertson is at the forefront of studies of the sensory mechanisms of the taste buds and has received worldwide attention for his identification of a sensory system that is responsive to dietary fatty acids.

Last, but certainly not least, our Executive Director, Dr. George A. Bray, will be recognized for his landmark contributions to the obesity field in November, 1999, at a special symposium to be held in his honor.

The North American Society for the Study of Obesity has asked me to organize a conference to acknowledge Dr. Bray's outstanding work in the clinical and basic sciences. My challenge is to select a few speakers from the vast number of scientists and physicians who have had the personal and professional benefit of collaborating with Dr. Bray over the last 30 years.

As our basic science program at the Pennington Center expands, this brings with it new challenges. One of these is managing the intense pressure on our existing facilities for the behavioral studies of animals. This is complicated by the concurrent rapid expansion in the use of these same facilities in other studies and breeding of transgenic animals.

Consequently, we're planning to expand our Comparative Biology facility by approximately 40 percent. This will provide us with new breeding and transgenic facilities and a new quarantine area for incoming animals.

We are grateful to the Pennington Medical Foundation for their continued support which allows us to expand and improve our existing facilities. Without their support, we would not have been able to attract a scientist of Dr. Kozak's caliber.

Meanwhile, the arrival of Dr. Kozak means that virtually all of the laboratory space in the basic science wing is occupied.

The arrival of Dr. Kozak means that virtually all of the laboratory space in the basic science wing is occupied.

To support the Pennington Center's newly formed Woman's Nutrition Research Program.

The Big Chill was a tremendously successful first public event for the WNRP," says Dr. Jennifer Lovejoy, chief of the program. "We are grateful to InRegister and our other sponsors and exhibitors for their participation. The WNRP received a great deal of positive feedback from attendees regarding the educational activities that were provided, not to mention the funds that were raised to support our activities."

The Preview Gala kicked off the weekend. Invited guests got their first look at more than 40 boutique-style booths on health and home, fashion and finance, family and friends, cooking and personal care. A fashion show for the 90s style show produced by Maison Blanche, wine and hors d'oeuvres by La Madeleine's French Bakery and Cafe, and music by the XL Jazz Group were also featured at the Preview Gala.

Summer Breeze: Big Chill Coordinator Karen Guinn-Wittick and Tuscarora Rodger's, Nancy Rodgers, and Jackie Burkawicz of InRegister.

WNRP in memory of Horn, Prevention of heart disease in women is one of the research goals of the WNRP.

The Big Chill continued the next day. On top of the more than 40 exhibits previewed the previous evening, the Saturday event featured a day spa and fashion advice by Maison Blanche, exercise tips for women, cooking demonstrations, and other special programs, including discussions on such issues as weight loss, menopause, alternative and herbal therapies, osteoporosis, and cardiac disease.

In addition to Nextel, InRegister, and the Pennington Biomedical Research Foundation, sponsors of the Big Chill include Gulfstar Communications, La Madeleine French Bakery and Cafe, Woman's Hospital and Billy Heroman's Flowerland.
NASA Program Gives High School Students Hands-on Experience in Biomedical Research

The high school students participated in an intensive eight-week summer apprenticeship program at the Pennington Center sponsored by the National Aeronautics and Space Administration and the Quality Education for Minorities Network. The students' participation was administered through Southern University.

Now in its sixth year, the goal of the SHARP PLUS program is to increase, strengthen, and diversify the pool of students for careers in mathematics, science, and engineering. During the course of the program, the students work with industry- or university-based mathematicians, scientists, and engineering professionals and engage in hands-on research. The students carried out research assignments, prepared a final report, and delivered an oral presentation at the end of the program.

Two hundred and forty students were chosen from more than 1,000 applicants nationwide. The SHARP PLUS program sets high expectations for academic achievement and seeks to increase the participation and success rates of minority students who are under-represented in challenging mathematics and science courses at the pre-college level. To be considered for the program students had to have a significant interest in pursuing a science- or engineering-related career. The students must also have completed a core group of science courses.

Now in its sixth year, the goal of the SHARP PLUS program is to increase, strengthen, and diversify the pool of students for careers and majors in mathematics, science, and engineering, with a grade of B or higher.

"SHARP PLUS gives students an opportunity to experience the practical aspects of academic research prior to applying for college," says Dr. Ruth Harris, one of the Pennington Center’s four mentors that participated in the program. "Being a mentor is very rewarding as students are always interested, highly motivated and excited about the opportunity to participate in research—even if they realize this is not what they want to do in the future."

Students participating in SHARP PLUS at the Pennington Center, their hometowns, the title of their final project, and their mentors are as follows:

- Carole Brashears: Washington, Ill. "Influence of Dietary Fat on Body Weight and Food Intake of Obese Mice." (Dr. Randy Myant)
- Sima Shah: Sherwood, Ar. "Determining the Chronic and Acute Effects of Simmsin on the Food Intake, Body Weight, Internal Composition, and Energy Expenditure in Male Sprague-Dawley Rats." (Dr. David York)
- Soliyana Pardo: Mayaguez, Puerto Rico. "The Role of Fetus in High and Low-Fat Diets and its Effects on OM and SSB Rats." (Dr. Steve Smith)
- Arica Guthrie: Upper Marlboro, Md. "A Leptin Dose Responsivity Study in Rats." (Dr. Ruth Harris)

The main goal of the program is to introduce students to a career that they might consider," says Carole Brashears. "I had been considering a veterinary career, but after working in Dr. Myant's lab, I'm thinking about biological engineering. The Pennington Center was everything I could have asked for. The people were so patient when I didn't understand. The thing that stuck out was that everyone loved to talk about their research. They truly enjoy their jobs," she says.

Two new studies indicate that beta blockers are not prescribed for many patients who could benefit from them after suffering heart attacks. One study, published in the Journal of the American College of Cardiology, reported that of 45,000 ideal patients to receive beta blockers, only 16% of the patients who had suffered a heart attack were prescribed the medication after hospital discharge. The second study, reported in the New England Journal of Medicine, found that mortality was lower in every group treated with beta blockers, including patients with complicating conditions such as diabetes. However, only about 34 percent of the patients left the hospital with a prescription for the drug.

Another study found that not even one of 168 preschool children followed over a week-period ate the five recommended daily servings of fruits and vegetables. The study, reported in the Journal of the American College of Nutrition, found that most ate only about half the recommended amount.

More evidence has come in that selenium lowers the risk of prostate cancer, according to researchers at the University of Public Health. A study of 8,000 men were analyzed to determine the levels of selenium, since the element tends to concentrate in the nails. Researchers found that men who didn't have prostate cancer had higher levels in their toenail clippings. These results follow previous studies that also showed a relation between selenium and a reduced risk for prostate cancer.

As for Smith, he's ready to test the results first hand at a moment's notice—"if NASA will be willing to send him up on a future shuttle flight. "I can have my bags packed in less than 30 minutes," he says.

And while the 48 volunteers won't join the astronauts that eventually walk on Mars, Smith's advice—"men and women were critical players in making that journey possible. They were champions," he says. We are greatly indebted to each of them, and couldn't have done our work without them."

Also, making significant contributions to this research were Drs. Jennifer Lovejoy and Jeffrey Zachwieja.

Almond Study: Men and women 18 years or older with normal or mildly elevated blood pressure are needed for this study of the effects of almonds in the diet on blood pressure. All men must be available for eight weeks. Reward: $400

Estrogen Patch: Postmenopausal women with adult onset diabetes between the ages of 40 and 70 are needed. The study will focus on the role of estrogen replacement therapy in reducing the risk of heart disease in African-American women. Reward: $400

Fiber: Female volunteers aged 45 to 55 are needed to participate in a 11-day study of fiber in the diet. Volunteers will have two extended stays at the Center with time off in between. Participants must be 50 or more pounds overweight, non-smokers, on no medication, and have maintained stable weight for at least six months. Reward: $150

Healthy Transitions: Women aged 47 to 52 are needed for this study that examines changes in body composition and fat before and after menopause. Volunteers will visit the clinic every six months for observation. To qualify, women must be healthy and have at least five menstrual cycles in the past six months. Participants receive annual stipends.

Med. Step: Men and women aged 35 to 65 are needed for this six-month study that compares dietary patterns and their effect in lowering cholesterol. Volunteers will receive dietary counseling and clinical assessments. Volunteers should be healthy and on no blood pressure or cholesterol lowering medications. Reward: $150

Call (225) 763-2596, 2597, or 2598 for more information.
It's Never too Late to Work that Body

The benefits of exercise and physical activity are too good for seniors to pass up.

By Dr. Jeffrey Zachwieja

Don't be in a hurry to win the Senior Olympics right out the starting block. Too much too soon is not only risky from a standpoint, it often throws cold water on initial enthusiasm. If it hurts, stop. Pain is the body's clue that you're probably doing something you shouldn't be doing.

Exercise as a group. But try to get involved in a group, whose fitness levels are similar to yours. Not only does exercising with others make it more enjoyable, but it seems to help maintain interest. No one wants to be the only one that lets the group down.

One sure-fire, easy, and inexpensive exercise that will develop endurance and lower body strength is walking. Remember, keep it slow: Five or 10 minutes a day at a speed that allows you to breathe and speak comfortably is a good place to start. The key is to walk every day. That way it becomes part of your lifestyle.

Invest in a good pair of walking shoes. Warm up by your own pace slowly for five minutes before you walk, and do the same thing after your walk to cool down.

As you become more comfortable, gradually increase the length of your walks and the pace. A good target to shoot for is to eventually walk 30 minutes each day at a comfortable pace.

While walking is an easy way to improve your endurance, another area of exercise that is important for seniors is physical stamina to improve muscle and bone strength. Resistance or strength exercise has even been found to ease pain from arthritis. Resistance training can be especially important in improving balance, thus reducing the risk of dangerous falls.

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Kozak

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Pennington Center Executive Director Dr. George A. Bray says Kozak's research work on gene transfer has brought substantial insights into the body's control of energy expenditure. "His broad base of intellectual knowledge and the grant support he brings with him will really add to the interest in the nutrition programs at the Pennington Center."

The move to the Pennington Center is Kozak's first job change since joining The Jackson Laboratory as a staff scientist in 1970. He says the offer from the Pennington Center came at a time when he needed additional resources and laboratory space to continue his research.

Kozak looks forward to collaborating with other scientists at the Pennington Center who are conducting genetic and molecular studies of obesity. He is also intrigued by the health department's studying fat fraction and its effect on energy expenditure in humans through the Pennington Center's clinical facility. Such research would not have been possible at The Jackson Laboratory, since it does not conduct human research.

Kozak and his wife, Ulrike, have five grown children, three horses and two dogs. The dogs are joining them in Baton Rouge, but the horses will stay here.

"I'm very excited about this opportunity, and I look forward to continuing my research at the Pennington Center," he says.

The Claude Bernard Chair was established in 1989 by the Irene and C.B. Pennington Foundation. Matching funds to complete the chair were provided by the Louisiana Board of Regents through the Eminent Scholars Act.
Dr. William Hansel figured he wasn't cut out to be a bureaucrat. He had plenty of time to think about a fledgling career in paperwork during a year-long recovery from a wound suffered while leading a company of the U.S. Third Army on the drive to the Rhine River during World War II.

After having earned a degree in agricultural economics and animal science at the University of Maryland, Hansel had accepted a position at the U.S. Department of Agriculture prior to the bombing of Pearl Harbor. But while healing from his war injury, he decided to take advantage of the G.I. Bill, return to school, and concentrate on animal physiology. "I would have been shuffling paper and going over statistical reports. I decided to change careers and have never regretted it," says Hansel.

It proved to be a fortuitous decision for both Hansel and his chosen field. Fifty-two years after enrolling at Cornell University as a graduate student in animal physiology, Hansel was presented in August with the first Pharmacia and Upjohn Award for lifetime contributions to the study of reproduction in domestic ruminants.

A glimpse at his career shows that it is an award well deserved. Hansel is credited for identifying the cause of X-disease, a discovery that led to the eradication of this costly illness that retards growth and stops reproductive functions in cattle. His laboratories are also recognized for providing much of the basic knowledge of the reproductive process on which artificial insemination, embryo transfer, and cloning are based.

Much of Hansel's landmark research was performed at Cornell University, where he received his graduate and doctoral degrees and served on the faculty from 1949 until 1990. Hansel only left the upstate New York institution because the state had a mandatory retirement law in place at the time.

But again, fortune smiled on Hansel. He was recruited by Louisiana State University to be the first researcher to hold the Gordon Cain Endowed Professorship. A couple of years later, he was invited to set up his laboratory at the Pennington Center.

"I've thoroughly enjoyed LSU and the Pennington Center. It's been a great place to work, and I'm very happy here," says Hansel.

Meanwhile, the pace of his research shows no sign of slackening. Working with another specialist in reproductive endocrinology at the Pennington Center, Dr. Samuel McCann, Hansel and his colleagues are studying how drugs can be targeted to destroy specific cancer cells. The work is driven by applying what's been learned about the function of hormones and hormone receptors through his studies of reproduction.

"It's pretty exciting stuff," says Hansel with a gleam in his eye. "I'm still having a great time, that's for sure."