

New UCSD Center Stretches the Boundaries of Muscle Research

June 13, 2006

Debra Kain

With the aim of bridging the gap between basic science and rehabilitation science, the National Skeletal Muscle Research Center (NSMRC) was established at the University of California, San Diego (UCSD) School of Medicine in September 2005. The NSMRC connects a wide range of muscle research fields—from molecular biology and biomechanics to magnetic resonance imaging and clinical studies—in order to provide the knowledge and tools needed to advance skeletal muscle rehabilitation science. Supported through a five-year, \$3.2 million grant from the National Institutes of Health, the NSMRC is one of only six centers in the country that were selected to provide research infrastructure to rehabilitation medicine.

"Our goal is to support high quality research that improves the lives of people with skeletal muscle injuries and diseases," said Richard L. Lieber, Ph.D, professor of Orthopaedic Surgery and Bioengineering at UCSD, who leads the collaborative project.

Lieber works with co-directors from UCSD Departments of Orthopaedic Surgery, Bioengineering, Radiology and Medicine, in addition to an external advisory board of internationally recognized experts in muscle rehabilitation. The Center utilizes facilities throughout the UCSD campus, including the School of Medicine, the Jacobs School of Engineering and the Department of Veterans Affairs.

"This interdisciplinary approach is critical for the Center because muscle rehabilitation is a complex field of study that crosses the boundaries of several specialties," Lieber said. "Our goal is to support and train researchers within the rehabilitation community, as well as those outside the discipline who are interested in rehabilitation-directed projects. In addition, we'd like to lure excellent researchers from the fields of engineering and neurosciences to perform rehabilitation-related research."

Also head of the UCSD Skeletal Muscle Physiology Laboratory, Lieber has worked for more than 25 years applying basic principles of muscle physiology and biomechanics to clinical problems in rehabilitation, such as reconstructive hand surgery. This focus on rehabilitation research is also the basis for six NRMRC-funded projects at UCSD and across the country.

One of these projects currently underway involves people with spinal cord injuries. The research is led by Kim Anderson, Ph.D, assistant professor in the Department of Neurosurgery at the Reeve-Irvine Research Center, at the University of California, Irvine, who became a quadriplegic after an accident at age 17.

As a neuroscientist, Anderson studies axonal regeneration—the formation of communication conduits in the nervous system. But it is her experience as a spinal-cord injured person that makes her uniquely qualified to study the social pressures on individuals with these types of injuries.

"Having a spinal cord injury myself and talking with friends who have spinal cord injuries, I know that walking isn't what most impairs your quality of life. It's daily tasks like being able to get yourself dressed or go to the bathroom without assistance," Anderson said. Through the NSMRC, she is trying to understand the immediate needs of people living with spinal cord injury and use that information to target short-term research.

While supporting outside research, the NSMRC also investigates rehabilitation questions in Lieber's Skeletal Muscle Physiology Lab, which has a history of investigating muscle structure and creating novel approaches to reconstructive surgeries.

One such study, to be published later this year in the *Journal of Hand Surgery*, was conducted by Samuel Ward, P.T., Ph.D, NSMRC Director of Biomechanics and assistant professor in UCSD's Department of Radiology. Ward found that by rerouting the brachioradialis muscle, located in the forearm, patients with limited arm function due to spinal cord injury can improve their hand positioning and regain grasp.

"This project reflects the aims of the Center because it applies 'bench-top, scientific principles to existing 'real-world' functional rehabilitation problems," Ward said.

Ward will be working with Lieber to provide seminars on muscle rehabilitation subjects SUCH AS muscle architecture, imaging, and the scientific basis of surgical reconstruction.

"The training component is critical," Lieber said. "While researchers continue making new finds in muscle structure and disease, this knowledge is not always communicated within the rehabilitation community as widely as it should be."

Lieber's group has received the prestigious Kappa Delta Award from the American Academy of Orthopaedic Surgeons (AAOS) and the Nicolas Andry Award from the American Bone and Joint Surgeons (ABJS). In addition, he and his colleague Jan Fridén, M.D., Ph.D, from Gothenburg, Sweden, have been honored by the Federation of European Societies for Surgery of the Hand (FESSH).

For more information visit the NSMRC Web site.

Media Contacts: Debra Kain or Carina Stanton, (619) 543-6163