



HERL Quarterly Newsletter

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SUMMER EDITION
JUNE 2005

WRAMC AND HERL HOLD SECOND STATE-OF-THE-SCIENCE WORKSHOP

April 22nd 2005 marked the second collaborative effort between the Human Engineering Research Laboratories (HERL), of the VA Pittsburgh Healthcare System and the University of Pittsburgh, and Walter Reed Army Medical Center (WRAMC). A workshop entitled “State of the Science Workshop: Traumatic Brain Injury Research to Clinical Practice” was held at the WRAMC in Washington, D.C. The goal of the day long workshop was to provide participants with education and training in clinical trials, assistive technology, vocational rehabilitation, biomarkers, and basic science fundamental to the successful treatment of individuals with traumatic brain injury (TBI). The workshop was attended by over 175 physicians, therapists, social workers, counselors, rehabilitation engineers, and researchers and televised to as many as twenty locations.

The workshop was kicked off by Commander COL James K. Gilman, MD, and featured nine speakers. The morning session focused on TBI

physiology and interventions. Amy Wagner, M.D., Assistant Professor in the Department of Physical Medicine and Rehabilitation at the University of Pittsburgh, presented a talk entitled TBI Pathophysiology in which she discussed epidemiology and primary and secondary injuries associated with TBI. Ross Zafonte, DO, Professor and Chairman of the Department of Physical Medicine and Rehabilitation at the University of Pittsburgh, provided an excellent overview of TBI clinical interventions and what the future holds for such interventions. Steven Scott, DO, Chief of Physical Medicine and Rehabilitation at the James A. Haley Veteran’s Hospital, presented a talk entitled “Complications of Head Trauma Due to

Blast Injuries” in which he discussed three complications, their presentation in the patient, and the need for changes in the system of care for TBI patients. The final talk of the morning session was given by Henry Lew, M.D., Ph.D., entitled “VA/DOD TBI Research Outcomes.”



TBI workshop presenters. (L to R): Ron Hayes, PhD, Theresa Louise-Bender Pape, Ph.D., Deborah Warden, MD, Amy Wagner, MD, Paul F. Pasquina, MD, LTC, MC, Ross Zafonte, DO, Louis French, PsyD, Rory Cooper, Ph.D., Michael Pramuka, PhD, Henry Lew, MD, Steven Scott, MD

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The morning session was followed by a lunch workshop sponsored by WRAMC. A research panel discussion was lead by Deborah Warden M.D., from the Defense and Veterans Brain Injury Center. The afternoon session of the State of Science Workshop focused on rehab and interventions for patients after TBI. Ron Hayes, Ph.D., from the Center of Traumatic Brain Injury Studies at the University of Florida, gave a talk on the clinical use of biomarkers and how they can be used to improve patient management and clinical trial

design. The next topic was Vocational Rehabilitation of Persons after TBI, presented by Michael Pramuka, Ph.D., from the University of Pittsburgh’s Department of Rehabilitation Science and Technology. Dr. Pramuka discussed the importance of continued, long-term interventions and support for patients far beyond the post-acute frame. Dr. Theresa Louise-Bender Pape presented on speech pathology and swallowing and her work to create a useful rehabilitation measurement to measure neurobehavioral functioning after severe TBI.

HERL director Rory Cooper, Ph.D. presented the last talk for absent speaker Bambi Brewer from the

(continued on page 3)

CURRENT RESEARCH ABSTRACTS

Upper Limb Strength in Individuals with Spinal Cord Injury who Use Manual Wheelchairs

Aaron L. Souza, Ph.D., Michael L. Boninger, M.D., Shirley G. Fitzgerald, Ph.D., Sean D. Shimada, Ph.D.

Rory A. Cooper, Ph.D., & Fabrisia Ambrosio, MPT, MS

Full article appeared in *Journal of Spinal Cord Medicine*, Vol. 28, No. 1, pp. 26-32, 2005.

Purpose of Work: Manual wheelchair users commonly have shoulder pain and injuries.

The purpose of this study was to compare shoulder strength and muscle imbalance of individuals with paraplegia to able-bodied individuals. A secondary goal was to evaluate the impact of age and level of injury on shoulder strength.

Subjects/Procedures: Twenty-eight manual wheelchair users with a spinal cord injury and 28 unimpaired individuals completed shoulder strength testing of both arms. Muscle imbalance of the shoulder was also calculated.

Results: No significant difference was seen in shoulder strength of the manual wheelchair users



and the unimpaired individuals. However, level of spinal cord injury was significantly related to strength. People with a lower level of paraplegia were significantly stronger than people with a higher level of injury.

Relevance to People with Disabilities:

Strength at the shoulder is related to level of spinal cord injury. It is likely that this is related to contributions of the trunk and abdominal muscles during testing, since proximal trunk strength aids in generating forces in the arms. This study and others of strength in individuals with paraplegia may overestimate shoulder strength.

—Fabrisia Ambrosio

Impact of a Pushrim Activated Power Assist Wheelchair on the Metabolic Demands, Stroke Frequency and Range of Motion Among Individuals With Tetraplegia

S. David Algood, B.S., Rory A. Cooper, Ph.D., Shirley G. Fitzgerald, Ph.D.,

Rosemarie Cooper, M.P.T., A.T.P., and Michael L. Boninger, M.D.

Full Article appeared in *Archives of Physical Medicine and Rehabilitation (Model Systems Issue)*, Vol. 85, No. 11, pp. 1865-1871, November 2004.

Purpose of Work. To determine the differences in metabolic demands, stroke frequency, and upper extremity joint range of motion, during pushrim activated power-assisted wheelchair (PAPAW) propulsion and traditional manual wheelchair propulsion among individuals with tetraplegia.

Subjects. Fifteen fulltime manual wheelchair users with tetraplegia participate in the study. The demographics included: 12 males and 3 females, age 27 to 52 years (mean 37.3, SD 7.3), height 152 to 193 centimeters (mean 180.0, SD 11.4), and weight 45 to 116 kilograms (mean 78.5, SD 19.4).

Procedures. Participants propelled both their own manual wheelchairs and a PAPAW through three different resistances (slight, moderate and high), on a computer controlled wheelchair dynamometer. For metabolic testing, the variables that were compared between the two wheelchairs were the participants' mean steady state oxygen consumption, ventilation, and heart rate. For kinematic testing, the variables compared were mean stroke frequency, in addition to maximum upper extremity joint range of motion for: shoulder flexion/extension, internal/external rotation, abduction/adduction, horizontal flexion/extension; wrist flexion/extension, pronation/supination, ulnar/radial deviation; and elbow flexion/extension.

Results. When using the PAPAW, participants showed a significant ($p < 0.05$) decrease in mean oxygen consumption and ventilation throughout all trials. Mean heart rate was not significantly different between the two wheelchairs for the slight and moderate resistances, but was significantly lower when using the PAPAW for the high resistance trial. Conversely, stroke frequency was significantly lower when using the PAPAW for the slight and moderate resistances, but not significantly different at the high resistance. For a majority of the resistance conditions, overall joint range of motion was significantly lower when using the PAPAW for the following motions: shoulder flexion/extension, internal/external rotation, horizontal flexion/extension; wrist flexion/extension, pronation/supination, ulnar/radial deviation; and elbow flexion/extension.

Relevance to wheelchair users. For individuals with tetraplegia, PAPAWs reduce the energy demands, stroke frequency, and overall joint range of motion when compared to traditional manual wheelchair propulsion. Use of this device could help maintain overall physical capacity while reducing the risk for pain and injuries to the upper extremities, which are often seen among manual wheelchair users with tetraplegia.

—Eliana Chaves

CURRENT RESEARCH ABSTRACTS

Development of Compact Chin-operated Force-sensing Joystick

Songfeng Guo, PhD, Garrett Grindle BS, Rory A. Cooper, PhD

Full article appeared in Saudi Journal of Disability and Rehabilitation, Vol. 9, No. 4, pp. 212-217, October-December 2003 (published in 2005).

Purpose of the Work: Positions sensing joysticks and switch arrays have been the traditional means of interface for chin control users of electric powered wheelchairs. In this study, a force-sensing chin operated joystick has been developed as an alternative to these devices. The important difference between a position sensing joystick and a force-sensing joystick is that the latter requires no range of motion, which may allow for easier, more comfortable chin control.

Design Methods: The mechanical design of the chin controlled force-sensing joystick includes a base, force-sensing beam, covering case, and mounting bracket. The electrical design is comprised of two strain gage bridges, two instrumentation amplifiers, Tattletale control board, and a digital to analog converter. Software has been designed so that it determines the output characteristics.

Results: The result is an output curve that allows for proportional control, limits maximum speeds, and creates a dead zone that corresponds to no motion of the wheelchair. The software was able to change output characteristics to both a large and small degree without modifying the hardware. This software flexibility allows for customization of performance characteristics such as asymmetric or symmetric force, adjustable force sensitivities, and filter tuning.

Relevance to Wheelchair Users: The force-sensing joystick may provide an alternative to the position sensing joystick for chin control. The hardware-software design provides a highly customizable interface that could provide better control for users. The device also has the potential to be converted for use as computer control.

-Garrett Grindle

WRAMC AND HERL HOLD SECOND WORKSHOP *(continued)*



Over 175 health professionals attended the workshop

Robotics Institute at Carnegie Mellon University, entitled "Technology for People with TBI." In his talk Dr. Cooper touched upon current research being conducted in collaboration between the University of Pittsburgh and Carnegie Mellon University in which robots and visual feedback manipulation are being used to aid patients in completing target movements. Closing remarks were made by WRAMC Chief of PM&R LTC Paul Pasquina, M.D.

The first workshop to kick off the HERL/WRAMC collaboration effort was the "State-of-the-Science Workshop: Wheelchair Research and Clinical Practice." This first attempt was a huge success, beginning new and exciting relationships between researchers, clinicians, staff, and patients from both facilities. The next State of the Science Workshop is scheduled for May 27, 2005 and will focus on Spinal Cord Injury. The workshop will be another day long event hosted at Walter Reed Army Medical Center. Presentations from all HERL/WRAMC workshops are available or will be available for download at <http://www.herlpitt.org/publications.htm>.

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-Erica Authier

Current Events/ Announcements

Wheelin' Sportsmen, a non-profit organization that provides outdoor sporting activities, will be sponsoring **RHI and Wheelin' Sportsmen Fun and Learn Day** on July 23, 2005 in Indianapolis, IN For more information about the event, contact:

Al Smith
319-397-2303
wheelin@netins.net



The 15th annual **Hoops Classic, Pittsburgh's largest three-on-three basketball tournament** benefiting the HOPE Network's Healthsports program is scheduled for Saturday, June 18, 2005 on the North Shore between Heinz Field and PNC Park. The Healthsports program helps thousands of children and adults with disabilities achieve healthier lifestyles through participation in adapted sports, fitness, and recreation. The Hoops Classic is in need of volunteers for that day.

To volunteer, contact:
Bonnie Lewetag, 412-826-4931
Or for information in participating, contact:
Leah Gray, Healthsports Program Manager,
(412) 826-2703

HERL Design Team Visits India

Many people in the United States and other “developed” countries still use wheelchairs that only barely meet their needs; however, in India, the number of people using inappropriate wheelchairs or none at all is enormous by comparison.

These facts prompted the Indian government to seek collaboration with National Institute on Disability and Rehabilitation Research (NIDRR) and US wheelchair designers to improve the quality of their wheelchairs. The result has been a collaborative design project between HERL and Artificial Limb Manufacturing Company (ALIMCO, the largest wheelchair manufacturer in India) since 2000.

In 2001, representatives from HERL visited the Indian Spinal Injury Center and the ALIMCO manufacturing plant to establish the relationship and begin the design process. They informally evaluated ALIMCO’s current wheelchair design, and established priorities for collaboration. A HERL design team was formed, consisting of Rory Cooper, Mark McCartney, Emily Zipfel, Jeremy Puhlman, Jon Pearlman, and Rosemarie Cooper. By 2004 the design team had built and delivered to ALIMCO the first India Chair prototype, a lightweight, somewhat adjustable, comfortable, easy to maneuver, durable, and reliable wheelchair.



(Back, L to R): Jon Pearlman, Jeremy Puhlman, Rosemarie Cooper, Kiran Dhawan, Emily Zipfel, (Front, L to R): Rory Cooper, R. Lee Kirby, Mark McCartney.

After the 2004 visit, the HERL India design team returned to the drawing board to develop a Tilt-in Space Pediatric Wheelchair for ALIMCO. This type of chair can provide a good option for many children with disabilities who may be unable to independently shift weight and/or do not have the skills necessary to operate a power wheelchair.

In March 2005, the India Design team returned to India to deliver the Pediatric Wheelchair prototype, this time joined by R. Lee Kirby, M.D. from the Nova Scotia Rehab Centre in Canada. While in India, HERL director Rory Cooper also presented features and utilities of wheelchairs to more than 50 people at a program conducted by the Rotary Club of metro Kanpur. The design teams also visited and conducted a wheelchair workshop at the Indian Spinal Injury Center (ISIC) in New Delhi. The ISIC is working towards establishing a graduate school in medical rehabilitation with the guidance from Pitt’s School of Health and Rehab Sciences.

Both the pediatric and manual wheelchair prototypes will bring large scale wheelchair manufacturing to India and give Indian citizens with disabilities affordable and appropriate mobility devices. The manual wheelchair is due to go into mass production in August 2005. The pediatric manual wheelchair should launch in late 2006 in India.

The final phase of the ALIMCO-HERL collaboration planned thus far is to develop an electric powered wheelchair.



This red manual wheelchair designed by HERL will be mass produced and sold in India

-Emily Zipfel, Rory Cooper, Christine Heiner

Current Events/Announcements

The **Rehabilitation Engineering and Assistive Technology Society of North America (RESNA)** will be holding their 2005 conference from June 23-27 at the Atlanta, GA Hyatt Regency. This year’s conference marks the official 25th anniversary of RESNA as an organization of rehabilitation professionals dedicated to working with people with disabilities and technology. This is the most prominent conference for students at HERL and in the Department of Rehabilitation Science and Technology at the University of Pittsburgh. This year HERL faculty, staff, and students had 28 papers accepted for presentation at the conference. For more information on RESNA, visit www.resna.org or call (703) 524-6686

The **25th annual National Veterans Wheelchair Games** is from June 27– July 1, 2005 in Minneapolis, MN. The NVWGs, sponsored by the Department of Veterans Affairs and the Paralyzed Veterans of America, is a multi-event sports and rehab program for military veterans who use wheelchairs for sports competition. For more information on attending or volunteering for the games, contact Sharon Skoblik, at Minneapolis VA Medical Center (612) 467-5273 or visit www1.va.gov/vetevent/nvwg/2005/default.cfm. A team of HERL investigators and students will be at the games, conducting research and distributing information about HERL and our work. Hope we see you there!

Agency Spotlight: United Spinal

Veterans with spinal cord injuries founded the Eastern Paralyzed Veterans of America (EPVA) in 1946 to empower veterans with disabilities to lead full and productive lives. In 2004, EPVA changed its name to United Spinal and expanded its mission to include all people with spinal cord injury and disease. United Spinal has over 4,000 members in the U.S.; membership is open to all people of all ages with spinal cord injury or disease. The organization strives to enhance the lives of its members through advocating civil rights and independence, ensuring quality health care, and promoting research. Some of the ways through which United Spinal realizes its mission are by supporting wheelchair sports and



physical fitness, distributing over 100,000 publications annually to educate people on disability issues, and drafting and fighting for disability legislation.

United Spinal is a major source of research funding for spinal cord injury and disease, providing over \$52 million to research programs since the 1970's. United Spinal has provided generous donations to HERL since we were founded in 1994 to support our research and development projects.

On United Spinal's website, www.unitedspinal.org, you can learn more about the organization's extensive services, apply for membership, and download free publications. United Spinal also publishes a monthly magazine called *Orbit*.

-Christine Heiner

HERL IN THE MEDIA

VA Pittsburgh Healthcare System, A Celebration of Excellence 2003-2004, p. 2: National Awards: Rory Cooper, Ph.D.

Orbit, April 2005, pp. 8-9: National Disability Advocates Hold Briefing on Policy that Makes People with Disabilities Prisoners in their Own Homes

VISN 4: Have you Heard?: Rory Cooper Chosen to be Inducted to NSCIA Hall of Fame

Paraplegia News, February 2005, pp. 79-80: A Legacy

Hindustan Times (Indian Newspaper), March 6, 2005: On Wheelchair, He's Come a Long Way

Metro Today (Indian Newspaper), March 10, 2005: Scientist from the USA will Work with ALIMCO

Kanpur Youth (Indian Newspaper), March 10, 2005: Rory Cooper Presents at Kanpur Rotary Club

Kanpur News (Indian Newspaper), March 10, 2005: More Comfortable Wheelchairs

NSCIA SCI E-News, March 23, 2005: National Spinal Cord Association Hall of Fame Inductees

RESNA Pre-Conference News 2005, pp. 6-7: RESNA President Rory Cooper Ph.D. Named to SCI Hall of Fame

SCI Life, Spring 2005, p. 6: SCI Hall of Fame Inductees

Pitt Alumni Connections, Spring 2005, p. 11: SHRS Shares Rehabilitation Expertise Worldwide

HERL PUBLICATIONS

Algood SD, Cooper RA, Fitzgerald SG, Cooper RM, Boninger ML, Effect of a Pushrim Activated Power Assist Wheelchair on the Functional Capabilities of Persons with Tetraplegia, **Archives of Physical Medicine and Rehabilitation**, Vol. 86, No. 3, pp. 380-386, March 2005.

Ding D, Cooper RA, Electric Powered Wheelchairs: A Review of Current Technology and Insight Into Future Directions, **IEEE Control Systems Magazine**, Vol. 25, No. 2, pp. 22-34, April 2005.

Souza AL, Boninger ML, Fitzgerald SG, Shimada SD, Cooper RA, Ambrosio F, Upper Limb Strength in Wheelchair Users with Spinal Cord Injury Who Use Manual Wheelchairs, **Journal of Spinal Cord Medicine**, Vol. 28, No. 1, pp. 26-32, 2005.

Wainner RS, Fritz JM, Irrgang JJ, Delitto A, Allison S, Boninger ML, Development of a Clinical Prediction Rule for the Diagnosis of Carpal Tunnel Syndrome, **Archives of Physical Medicine and Rehabilitation**, Vol. 86, No. 4, pp. 609-618, April 2005.

Guo G, Grindle G, Cooper RA, Development of a Compact Chin-Operated Force Sensing Joystick, **Saudi Journal of Disability and Rehabilitation**, Vol. 9, No. 4, pp. 212-217, October-December 2003 (published in 2005).

Cooper RA, Top 10 Advances, **Paraplegia News**, Vol. 59, No. 3, pp. 49-50, March 2005 (also published in **Sports 'n' Spokes**, March 2005. pp. 48-49.)

Heiner CM, Cooper RA, A Boost for Quality of Life, **Paraplegia News**, Vol. 59, No. 4, pp. 51-56, April 2005.

HERL AWARD WINNERS



Dr. Alicia Koontz

HERL investigator Alicia M. Koontz, Ph.D., ATP, RET, received the 2005 Liberty Mutual Best Paper Award for "Scapular range of motion in a quasi-wheel chair push" (Koontz AM, Cooper RA, Boninger ML, Souza AL, Fay BT), published in *International Journal of Industrial Ergonomics*, Volume 33, Number 3, 2004. Liberty Mutual and Elsevier, the publisher of the

International Journal of Industrial Ergonomics

chooses the most exceptional paper printed in the journal yearly to receive this award to merit excellence in safety and health research.

Our Director Rory A. Cooper, Ph.D. was inducted into the National Spinal Cord Injury Association "SCI Hall of Fame" on May 9, 2005. The SCI hall of Fame has been created to celebrate and honor those individuals that have made significant contributions to quality of life and advancements toward a better future for all individuals with spinal cord injury. Dr. Cooper was elected in the Assistive Technology category.

This year two HERL graduate students won scientific paper award winners for the RESNA student paper competition: Jen Mercer for her paper entitled "Effect of Weight on Wheelchair Propulsion Over Various Surfaces" and Yusheng Yang for his paper "Start-Up Propulsion Biomechanics Using a Prototype Ergonomic Pushrim". Elizabeth Leister and Megan Yarnall from HERL also received honorable mentions for their papers. Other scientific paper winners from The University of Pittsburgh Department of Rehab Science and Technology included Ashley Rotko, JongBae Kim and Marissa Ammer (Honorable Mention).



2005 RESNA paper winning students (L to R): Liz Leister, Yusheng Yang, Jen Mercer, Megan Yarnall

HERL doctoral student Jonathan Pearlman received the 2005 Rory A. Cooper and Dion Johnson student paper award for his RESNA paper "Economical (K0010) Power Wheelchairs Have Poor Reliability and Important Safety Problems: An ANSI/RESNA Wheelchair Standards Comparison Study."

HERL Alumnus Sean Shimada, Ph.D. was the first recipient of the RST Distinguished Alumni Award at the School of Health & Rehab Sciences 35th Anniversary Celebration on April 9, 2005. Dr. Shimada completed his Ph.D. in Rehab Science and Technology at HERL in 1997 and is currently the president of Biomechanical Consultants of California, a forensic consulting firm.



Rory Cooper (L) congratulated HERL doctoral student Jon Pearlman (R) on receiving the 2005 Rory Cooper and Dion Johnson Student Paper Award

-Christine Heiner

RECENTLY FUNDED GRANTS

"Development of an Ergonomic Manual Wheelchair Pushrim" (SBIR Phase II, Three Rivers Holdings). Principle Investigator: Ron Boninger. (HERL PI: Michael Boninger, MD) National Institutes of Health (NICHD). June 1, 2005--May 31, 2007, \$747,682

"Datalogger Development for Wheelchair Mobility Outcomes (STTR Phase I, Three Rivers Holdings). Principle Investigator: Dan Ding. National Institutes of Health (NICHD). June 1, 2005--May 31, 2006, \$100,000.

Rehab Counseling at Pitt

Rehabilitation counselors work collaboratively with people with disabilities to understand existing problems, barriers, and potentials, facilitate the individual's use of resources and services for career, personal, social, and community adjustment. Rehabilitation counselors assist individuals with disabilities adapt to their environment, to work with those environments to accommodate the needs of the individuals with disabilities, and act as advocates for the full participation of individuals with disabilities in all aspects of society.

In the last few years, the University of Pittsburgh's School of Health and Rehabilitation Sciences began offering a degree program in Rehabilitation Science and Technology with a concentration in Rehabilitation Counseling under the direction of Michael McCue Ph.D., CRC.

The Rehab Counseling program recently established a new relationship with Mercy Behavioral Health, Mental Health Rehabilitation and Employment Services, which has expanded their practicum and internship opportunities to 7 new clinical sites for Psychiatric Rehabilitation.

-news contributed by Don Angelone, M.Ed., Department of Rehab Science and Technology, University of Pittsburgh

HERL INVENTION NOW ON THE MARKET



The GAME^{Cycle}TM, an exercise device for people with disabilities, is now available for purchase from Three Rivers Out-Front. The Game^{Cycle}TM fuses upper body exercise with video game play for an exciting workout experience. To purchase or learn more about the GAME^{Cycle}TM, contact:

Three Rivers Out Front
1826 W. Broadway Rd.
Mesa, AZ, 85202
(480) 833-1829
www.3rivers.com

News from the Department of Physical Medicine and Rehabilitation

Several staff and residents from the department attended the annual Association of Academic Physiatrists Conference in Tucson, Arizona in February of this year. The association was founded in 1967 as a national organization for physiatrists associated with medical schools. Its mission is to "promote excellence in education, research, and the practice of Physical Medicine & Rehabilitation within the academic arena."

Congratulations to:

Amy Wagner, MD, Associate Professor PM&R received the AAP Young Academician Award. The award is given to only one association member in a particular year. Dr. Wagner was honored for outstanding performance in teaching, research and administration.



Amy Wagner, MD

PM&R resident **Tagreed Khalaf, MD** was honored with the Best Resident Student Paper for "Changes in Biceps Tendon Related to Exercise." Dr. Khalaf is in her 4th post graduate year.

Third year resident **Heather Walker, MD** received the AAP award for Best Poster by a Resident. The poster illustrated her work in "Ultrasound Evaluation of the Median Nerve Before and After Intense Wheelchair Activity."

Michael L. Boninger, MD was the faculty supervisor for both Dr. T. Khalaf and Dr. H. Wagner. Dr. Boninger was the 1998 recipient of the AAP Young Academician Award.

Past resident AAP award winners include: Brad Dicianno, MD (2004, 2001) Holly Zhao, MD (2003), and Edwin Capulong, MD (2002).

PM&R Recent publications:

Effect of Rehabilitation Site on Functional Recovery After Hip Fracture, Munin MC, Seligman K, Dew MA, Quear T, Skidmore ER, Gruen G, Reynolds CF, Lenze EJ, Arch of PM&R, Vol. 86, Iss.3 pp 367-372.

-news contributed Mary Synnott, Dept. Physical Medicine & Rehab, University of Pittsburgh

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the newsletter to the editor, Christine Heiner at:
Email: heinercm@pitt.edu

VA Center Of Excellence For
Wheelchairs and Associated
Rehabilitation Engineering

University of Pittsburgh Model
Center on Spinal Cord Injury

Rory A. Cooper, Ph.D.
Director

Michael L. Boninger, M.D.
Medical Director

Shirley G. Fitzgerald, Ph.D.
Associate Director of Research,

Donald M. Spaeth, Ph.D., ATP, RET
Associate Director of Engineering



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ARE YOU INTERESTED IN WHEELCHAIR RESEARCH?

The Human Engineering Research Laboratories is recruiting individuals interested in participating in research studies for the **WHEELCHAIR USERS REGISTRY**. If you would like to be notified of Wheelchair related Research Studies for which you may be eligible to participate, contact The Human Engineering Research Laboratories and join the Wheelchair Users Registry. This is an informational resource and notification of a study does not obligate you to participate. You do not need to be located in nor are you required to travel to Pittsburgh in order to participate in research studies. If you are at least 18 years of age, and use a wheelchair or scooter, please contact **Rosi** or **Annamarie** for more information.

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