



HERL Newsletter

VOLUME 9, ISSUE 1
 SPRING
 MAY 2010

U.S. Chairman of the Joint Chiefs of Staff Tours HERL



On April 19, U.S. Chairman of the Joint Chiefs of Staff Admiral Michael Mullen came to Pittsburgh to deliver a “Town Hall Meeting” on building community-based support for integrating returning veterans across the Pittsburgh region. The event was hosted by University of Pittsburgh Chancellor Mark Nordenberg. HERL director Dr. Rory Cooper served as the discussion moderator and leaders of several local veterans organizations served as panelists, including Michael Moreland, Network Director of the VA Healthcare - Veterans Integrated Service Network 4, and Terry Gerigk Wolf, Director and CEO of the VA Pittsburgh Healthcare System.

Following the Town Hall Meeting, Admiral Mullen visited several Pittsburgh laboratories who are engaged in research to help veterans with disabilities. He came to the University of Pittsburgh Department of Rehabilitation Science and Technology’s Bakery

Square Offices to see the latest research innovations from HERL, the Pitt Rehabilitation Engineering Research Centers, and Pitt’s newly established orthotics and prosthetics program. The Admiral was eager to interact with HERL technology demonstrations such as the PerMMA, a system of remote control operated power wheelchair robotic arms, and GameCycle, a video game exercise system for wheelchair users. *-Christine Heiner*

INSIDE THIS ISSUE:

| | |
|---|-------|
| Research Abstracts | 2-3 |
| US Chairman of the Joint Chiefs of Staff Tours HERL | 4 |
| Awards and Accomplishments | 5 |
| Meet the Education and Outreach Staff | 6 |
| HERL in the News | 7 |
| 2010 Winter Sports Clinic Research | 8 |
| HERL Publications | 8-9 |
| State of the Science Workshop: Care of the Combat Amputee | 10-11 |

New Beginning for First HERL Staff Member

Spring 2010 marked the departure of HERL’s first staff member. After almost 16 years, our Administrative Officer Paula Stankovic accepted a new position with the VA Pittsburgh Healthcare System as a contract specialist. Paula worked at HERL from its’ beginning, starting as our director Dr. Rory Cooper’s assistant when he moved from California to Pittsburgh in 1994. Back then, the lab consisted of only 2 graduate students and Paula who oversaw all clerical, clinical, and administrative duties. As we expanded over the years, Paula became our Research Coordinator and later our Administrative Officer (AO). Throughout her career at HERL, she has probably performed almost every duty currently covered by about 9 research support staff, including subject testing, grant submissions, website maintenance, technology transfer and invention disclosure submissions, and the coordi-



Paula Stankovic departed HERL after 16 years for a new position with the VA

nation of the summer internship program. Paula was also the first to organize many activities that have developed into formal programs, such as the Walter Reed State of the Science Lecture Series and the Tech-Link robotics camps. As AO, Paula oversaw budgets for all grant submissions, ensured HERL’s compliance with VA and University of Pittsburgh rules and regulations, supervised the HERL research support staff, and administered employee payrolls and records for all faculty, staff and students.

Because of her experience and willingness to share, the HERL staff considered her “the person with the answers.” In December, Paula completed her Associates degree in business management with honors. She is planning to return to school in the fall to complete her bachelors.

I’m sure our many research participants, colleagues and supporters who have had the opportunity to work with Paula join us in appreciation of her dedication to our continued success and wish her the best in her career. *-Christine Heiner*

CURRENT RESEARCH ABSTRACTS

Does Upper Limb Muscular Demand Differ Between Preferred and Non-Preferred Sitting Pivot Transfer Directions in Individuals With Spinal Cord Injury?

Dany Gagnon, PT, PhD; Alicia M. Koontz, PhD, RET; Eric Brindle, BSE Student;
Michael L. Boninger MD; Rory A. Cooper PhD

Full article published in *Journal of Rehabilitation Research and Development*, pp. 1099-1108, Vol. 46, No. 9, 2009.

Purpose of the work: The main objective of this study was to determine if upper limb muscular effort was reduced when performing a sitting pivot transfer in the preferred direction in comparison to doing so toward the non-preferred direction among individuals with a spinal cord injury (SCI).

Subjects/Procedures: Fourteen individuals (on average: 47.0 years; 1.80 m, and 75.3 kg) with SCI levels ranging from C6 to S1 participated in this study during the 2008 National Disabled Veterans Winter Sports Clinic. Surface electromyography (EMG) was used to record activity of key upper limb muscles during sitting pivot transfers. These transfers were performed in each the preferred and non-preferred directions from their wheelchair to a padded tub bench of even height.



HERL researcher Dany Gagnon attaches surface EMG sensors to athlete and study participant Jake Hipps to compare the amount of muscular effort he needs during wheelchair transfers.

Results: Similar peak muscular efforts were found between the preferred and non-preferred transfer directions for all muscles. The peak muscular effort were also found to be similar between the leading and trailing upper limbs during the transfers in all muscles, except for one (anterior deltoid) found to be solicited the most at the trailing upper limb. Comparable overall muscular work was calculated between the preferred and non-preferred transfer directions for all muscles and between the leading and trailing upper limbs.

Relevance to manual wheelchair users with SCI: These results indicate that direction preference expressed by individuals with a SCI when transferring is not explained by relative muscular effort difference.

-Dany Gagnon, PhD

Reliability of Quantitative Ultrasound Measures of the Biceps and Supraspinatus Tendons

Jennifer L. Collinger, PhD; Dany Gagnon, PhD, PT; Jon Jacobson, MD;
Bradley G. Impink, BS; Michael L. Boninger, MD

Full article published in *Academic Radiology*, pp. 1424-1432, Vol. 16, No. 11, November 2009.

Purpose of the work: Ultrasound has been widely used clinically to examine soft tissue structures, including tendons. However, in order to use ultrasound in a research setting, it's reliability must be quantified. Ultrasound will allow us to evaluate acute changes of shoulder rotator cuff tendons in response to activity, such as wheelchair propulsion.

Subjects/Procedures.: Two examiners captured ultrasound images of the non-dominant long head of the biceps tendon and supraspinatus tendon from twenty volunteers, including 5 manual wheelchair users. Each examiner captured two images per subject under two different preparations which includes subject positioning and reference marker placement. Image processing, or reading, was performed twice to compute 9 quantitative ultrasound measures of grey-scale tendon appearance using first-order statistics and texture analysis. Generalizability theory was applied to compute inter- and intra-rater reliability

using the coefficient of dependability, Φ , for multiple study design protocols.

Results: Inter-rater reliability was generally low, and we recommend that a single evaluator capture all images for quantitative ultrasound protocols. Most (n = 14 of 18) of the quantitative ultrasound measures exhibited at least moderate ($\Phi > 0.50$) reliability for a single image, captured under one preparation, and read once. However, by following a protocol designed to minimize measurement error, one can increase the reliability of quantitative ultrasound measures.

Relevance to Wheelchair Users: We believe that an appropriately designed protocol will allow quantitative ultrasound to illustrate acute tendon changes and lead to the development of interventions to reduce risk factors for musculoskeletal injury.

-Jen Collinger, PhD

CURRENT RESEARCH ABSTRACTS

Biomechanical Analysis of Functional Electrical Stimulation on Trunk Musculature During Wheelchair Propulsion

Yu-Sheng Yang, PhD, Alicia M. Koontz PhD, RET, Ronald J. Triolo PhD, Rory A. Cooper, PhD, and Michael L. Boninger MD

Full Article published in *Neurorehabilitation and Neural Repair*, pp. 717-725, Vol. 23, No. 7, September 2009.

Purpose of the work: The objective of this study was to examine how surface functional electrical stimulation (FES) of trunk muscles influences propulsion technique and shoulder muscle activity in a group of individuals with spinal cord injury.

Subjects/Procedures: Eleven manual wheelchair users (MWUs) with paraplegia enrolled in this study. Two surface electrical stimulators were used to artificially contract paralyzed abdominal and back muscles. Propulsion forces and moments, trunk motion, energy expenditure, and surface electromyographic (sEMG) activity of six shoulder muscles were collected synchronously during a series of propulsion trials. Two different stimulation levels (LOW

and HIGH) were compared to a control condition (no stimulation).

Results: The results showed that participants with HIGH stimulation produced higher propulsion power output ($p=0.02$) and increased their gross mechanical efficiency (GME) ($p=0.05$) during wheelchair propulsion. No differences were found in shoulder sEMG activity, energy expenditure, and trunk motion between stimulation levels.

Relevance to Wheelchair Users: Our findings indicate that FES applied to the trunk musculature has a potential advantage in helping MWUs with SCI improve propulsion efficiency without placing additional demands on the shoulder muscles.

-Yusheng Yang, PhD

Upper Limb Nerve Entrapment Syndromes in Veterans with Lower Limb Amputations.

Jay Pyo, DO, Paul F. Pasquina, MD, Michael DeMarco, DO, Robert Wallach, DO, Emily Teodorski, BS, Rory A. Cooper, PhD

Full article published in *PM&R Journal*, pp. 14-22, Vol. 2, No. 1, January 2010.

Purpose of the Work: The purpose of this pilot study was to examine the prevalence and severity of upper limb entrapment syndromes in a sample of veterans with lower limb amputations.

Subjects/Procedures: Twenty subjects were recruited at the 2008 National Disabled Veterans Winter Sports Clinic. All study subjects completed a questionnaire which included symptomatology of both upper limbs, past medical history, time since amputation, medication history, use of assistive technology, and wheelchair characteristics. A physical exam and electrodiagnostic test was then performed on each subject. The physical exam included an assessment of bilateral upper limb weakness or sensory abnormalities, thenar/hypothenar atrophy, deep tendon reflexes, Tinel's test of the wrist and elbow, and Phalen's maneuver.

Results: Twenty subjects (19 male and 1 female) were enrolled in the study, with a total of 38 upper



Jay Pyo with study participant and wheelchair athlete Dianna Lopez at the 2008 Winter Sports Clinic

limbs evaluated. The mean age of the subject population was 59+13 years, with an average of 23 years since the time of their amputation. A total of 16/20 (80%) subjects had electrodiagnostic findings consistent with median neuropathy across the wrist (26/38 affected limbs, 6 subjects with unilateral and 10 subjects with bilateral findings), and 14/20 (70%) subjects had ulnar entrapment neuropathy across the elbow (22/38 affected limbs, 6 subjects with unilateral and 8 subjects with bilateral findings). Several subjects (6/20, 30%) were found to have electrodiagnostic evidence of ulnar entrapment neuropathy across the wrist (10/38 affected limbs, 2 unilateral and 4 bilateral findings).

Relevance to People with Amputations: Although this was a pilot study, we identified a high number of veterans with lower limb amputations who presented with upper limb nerve entrapment syndromes.

-Jay Pyo, DO

Former HERL Graduate Student Joins Technical Staff



Former graduate student Corey Blauch returns to HERL as a research engineer

Corey Blauch completed his masters of science in Rehabilitation Science and Technology while working at HERL in 2002. Corey's thesis project was designing the forward folding collapsible ultralight wheelchair, which is currently in the process of being patented. This unique wheelchair disassembles and folds to fit into an airplane's overhead bin and features "airplane wheels," which allows the chair to act as an aisle chair for mobility inside an aircraft.

Corey left HERL to work as a design engineer for Pride Mobility, a wheelchair manufacturer in Exeter, PA. Later Corey worked as senior human factors engineer at Gentex Corporation, where he developed the next generation aircrew helmet for the military.

This spring Corey returned to HERL to become the sixth member of our technical staff who support our machine shop and electronics lab that house the resources for the development and testing of designs, fabrications and prototypes for our research projects.

VAPHS Hosts Air Rifle Clinic for Veterans with Disabilities

In preparation for the 2011 Pittsburgh National Veterans Wheelchair Games, the VA Pittsburgh Healthcare System held a free instructional air rifle clinic on March 26 and a sectional championship on March 27 for Veterans with physical disabilities. The event was part of the 2010 National Rifle Association National Disabled Indoor Sectional Championship and was co-hosted by the HOPE Network and the Keystone Paralyzed Veterans of America.

The 2011 National Veterans Wheelchair Games are scheduled for August 1-6, 2011. Veteran athletes will compete in 17 sports such as quad rugby and archery, power soccer and weight-lifting in an exciting combination of competition, camaraderie and courage.



IMPORTANT ANNOUNCEMENT **FOR HERL NEWSLETTER E-MAIL** **SUBSCRIBERS**

Please be aware that we are using different e-mail subscription software to deliver the newsletter to you.

To make sure that you don't miss any future issues, please make sure to configure your e-mail to allow messages from the address

herlnewsletter@list.pitt.edu
to be delivered.

You can view general information about the list and subscribe or unsubscribe from the list at <https://list.pitt.edu/mailman/listinfo/herlnewsletter>.

The old newsletter announcement list was de-activated.

Thanks for your cooperation!

Awards and Accomplishments



Nahom Beyene

Nahom Beyene was awarded a National Society of Black Engineers (NSBE) Alumni Extension Technical Scholarship. Recipients of this award have shown great achievement in the academic arena and dedicated service to NSBE and their local campus community. Nahom received a \$2,000 scholarship and recognition at the 2010 NSBE Golden Torch Awards ceremony in Toronto.

Amit Kumar was awarded 1st and 3rd place in the 2010 University of Pittsburgh School of Health and Rehab Sciences poster contest for his work in graduate research class projects: “Forward Facing Wheelchair Securement System” and “Assessing the Test- Retest Reliability of Functional Mobility Assessment.”

HERL Director **Rory Cooper, PhD** received the Greater Pittsburgh Council of the Boy Scouts of America 2010 Community Cornerstone Award for his selfless volunteer community leadership. The VA Pittsburgh Healthcare System also recognized Dr. Cooper during VA Research Week in April for his outstanding commitment to excellence in research to improve Veterans lives.



Kevin Toosi (top) and Shiv Hiremath (bottom)



Shivayogi Hiremath and **Kevin Toosi** were among the winners of the 2010 Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) Student Scientific Paper competition. Shiv’s paper is entitled “Evaluation of Activity Monitors in Estimating Energy Expenditure in Manual Wheelchair Users”. Kevin Toosi’s award winning paper, “Investigation of Median Nerve Entrapments in Veterans with Major Limb Amputations,” was from a collaborative research project with Physical Medicine & Rehabilitation residents and staff from Walter Reed Army Medical Center. The winners will receive a \$1,000 honorarium and a free registration to the RESNA 2010

conference, June 28 – 29 in Las Vegas, NV. The winners will also present their work in a Platform Session at the conference.

Lynn Worobey was awarded a National Science Foundation Graduate Research Fellowship. The fellowship program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master's and doctoral degrees in the U.S. and abroad.

HERL staff, students and faculty raced in the Pittsburgh marathon and half marathon on May 2. **Attila Domos**, an accomplished athlete who has participated in countless HERL research studies, and **Dr. Rory Cooper** competed in the 26.2 mile wheelchair handcrank division. Attila took 1st place, completing the race in 1 hr and 33 minutes. Dr. Cooper took third in 1 hr and 46 minutes. **Mary Goldberg, Michelle Sporer, Shiv Hiremath, Amit Kumar, Jon Pearlman, and Harshal Mahajan** also ran the 13 mile half marathon. Mary and Michelle supported each other to complete the course in 1 hr and 59 minutes. The HERL racers raised money for the Veterans Leadership Program of Western PA.



Attila Domos (yellow) and Dr. Rory Cooper (red) took 1st and 3rd place in the Pittsburgh Marathon's competed in the 26.2 mile wheelchair handcrank division.

Meet the Education and Outreach Staff

Mary Goldberg, M.Ed., and Shelly Brown, M.Ed., are HERL's Education and Outreach Coordinators. Through collaboration with the University of Pittsburgh's Department of Rehabilitation Science and Technology, both ladies work diligently enriching student awareness and promoting academic programs from Kindergarten through the graduate level that focus on transforming the lives of people with disabilities.

Shelly Brown pursued her Master's degree in Education after 12 years of service as a Pittsburgh Police Officer. She is an active member of the Pennsylvania Coalition against Domestic Violence/ Women of Color Caucus, an advocacy organization for women and families experiencing domestic violence.

Shelly coordinates conferences, seminars and HERL tours to raise career awareness with respect to helping people with disabilities. Shelly collaborates with local community organizations, such as Jr. Achievement, and with local school districts organizing job shadowing seminars with the aid of our graduate students. Shelly coordinated a "Job Shadow Day" in December. A group of students from North Hills Senior High Technology Education Department visited HERL, returned to their classrooms with the wheelchair user in mind, and developed the "Techno-Tray". This wheelchair mounted tray is equipped with many gadgets found in high-end expensive automobiles, such as a GPS, device charger, and drink holder. In April these students revisited HERL and presented their project to our Faculty and graduate students.

Shelly also organizes the "State of the Science

Rehabilitation Research to Practice Symposia Series" in support of the Military Amputee Research Program. The purpose of the workshops is to bring expert scientists conducting state of the art research of immediate and future clinical relevance to the Army Medical Department, especially related to

severely war injured soldiers requiring medical rehabilitation. The symposia project has allowed us to facilitate four one day workshops per year at Walter Reed Army Medical Center in Washington, DC. The sessions are open to everyone - civilian, government, layman, patient, family member, provider, academics, industry, and researchers.

Shelly's dedication to Education and Outreach extends to writing and submitting grants to help fund academic programs connecting students with helping people with disabilities. Shelly plans to start doctoral level courses in social work in the fall.

Mary Goldberg oversees a few programs of great academic magnitude that are directed towards undergraduate, graduate, and Veteran students. Through the Quality of Life

Technology Engineering Research Center (QoLT), a unique partnership between Carnegie Mellon University and the University of Pittsburgh, Mary coordinates "The Research Experience for Undergraduates" (REU) which is an NSF funded program supporting undergraduate students in engineering or technical fields in a mentored research experience. Underrepresented groups and schools outside of Pittsburgh that do not foster research programs are targeted to participate in this program. Mary is currently organizing an incoming group of interns that will spend this summer working with Faculty and graduate students on HERL projects.



Top: Mary Goldberg (L) and Shelly Brown (R), HERL's Education and Outreach Coordinators. Bottom: North Hills Senior High Students present their design project, "The Techno Tray"



Mary also coordinates "The Research Experience for Teachers" (RET) through the QoLT, exposing highly motivated teachers to the context of quality of life technology that have direct applicability in the classroom. This program engages educators in cross-disciplinary research with QoLT students, researchers, and clinicians in the fields of engineering, rehabilitation sciences, and social sciences, emphasizing the significant role of end users in engineering research. It seeks to prepare educators to introduce and integrate emerging QoLT technology in the classroom, sensitize educators to common concerns, barriers, and stereotypes experienced by older individuals and people with disabilities and create a pipeline of opportunities and personal contacts for students interested in pursuing engineering studies.

Mary was actively involved in preparing a grant

proposal for the QoLT that was recently submitted to the National Science Foundation. "The Experiential Learning for Veterans in Assistive Technology & Engineering" (ELeVATE) is a comprehensive vocational rehabilitation program designed to prepare Veterans with disabilities for successful integration into engineering programs in higher education. Veterans will continue their rehabilitation therapy while participating in an experiential learning project. This program would include mentoring through research teams, study groups, counseling and Veterans support organizations in our region. The experiential learning and other preparatory activities will prepare Veterans for careers in engineering.

Mary is currently working on her doctorate in Education.
-Andrea Bagay

HERL IN THE NEWS

www.news.steelers.com, November 19, 2009:
[Steelers use Video Games to Help Others](#)

National Center on Physical Activity & Disability Website, Summer 2009: [Program Spotlight: 29th Annual National Veterans Wheelchair Games](#)

PittMed Magazine, Winter 2009: The "Now What" Field of Medicine

The Link, p. 7-10, Spring, 2010: Robots for Life

VA Office of Research and Development, April 2010: [85 Years of VA R&D](#)

VA Pittsburgh Healthcare System Annual Report, p. 10, March 2010: [Leading the Way in Wheelchair Research](#)

Stripe, February 25, 2010: [Leaders Take on Warriors' Challenges](#)

Universal Design Newsletter, January 2010: Research on How Cross Slope Affects Wheelchair Travel Announced

Whitehouse OSTP Blog, January 2010: [Celebrating Innovation at the Consumer Electronics Show](#)

USA Tech Guide Wheelchair Diffusion Blog, January 25, 2010:
[How Reliable is Your Wheelchair?](#)

Cal Poly College of Engineering, Winter 2010:
[EE Alumnus Dr. Rory Cooper named "Veteran of the Year"](#)

The American Veteran, April 2010:
[Human Engineering Research](#)

VA Pittsburgh Healthcare System, February 22, 2010: [VA Researcher Co-Edits Momentous Textbook](#)

Motion Control Online, January 2010:
[Goin' Mobile](#)

VA Pittsburgh Healthcare System, March 2010:
[Honored to Serve You](#)

VISN 4 Annual Report, p. 17, 2010: [We Promoted Veteran Centered Research](#)

University of Pittsburgh, March 25, 2010: University of Pittsburgh 2010 Institutional Spot/Researchers

Dept. of Veterans Affairs Employee Education System, March 2010: Wheeled Mobility in Multiple Sclerosis

US Chairman of the Joint Chiefs of Staff Website, April 2010: [Pittsburgh University Town Hall](#)

VA Research Currents, p. 3, February 2010:
[Robotic System May Put More Tasks Within Wheelchair Users' Reach](#)

2010 Winter Sports Clinic Research

2010 was another successful year for HERL research at the National Disabled Veterans Winter Sports Clinic in Snowmass, CO, where Veterans with disabilities compete in adaptive sports such as skiing, sled hockey, and rock climbing. We enrolled 107 subjects in the following 3 studies:

Improving Seating Interface Fit and Pressure for Adaptive Skiing (PI: Brad Dicianno, MD): We examined the seating interface pressures in a variety of sit skis, determined if a custom air bladder system can reduce interface pressure with better positioning, and used digital scanning technology to classify a series of adaptive ski molds that could be developed to suit the needs of a wide range of skiers.

The Impact of Transfer Setup on the Performance of Independent Transfers



Top: The 2010 WSC research team (L to R: Dr. Amy Kim, Dr. Jon Pearlman, Dr. Alicia Koontz, Eun-Kyoung Hong, Dr. Amy Murphy, Maria Toro, Justin Laferrier, and Michelle Oyster. Dr. Kim and Dr. Murphy are medical residents from Walter Reed Army Medical Center. Bottom: HERL investigators collect data to help the U.S. Access Board develop accessibility guidelines for wheelchair users.



(PI: Alicia Koontz, Ph.D.): Study participants performed wheelchair transfers to/from a custom-built, modular transfer station designed to emulate a variety of environmental conditions. The data collected in this study will help the U.S. Access Board develop guidelines to make recreational facilities accessible to persons with mobility impairments.

Identification of Prosthetic Users Who Transition to Wheelchair Use for Primary Mobility (PI: Justin LaFerrier, MPT): We collected feedback from lower extremity prosthetic users to determine the rate at which they switch to the use of a wheelchair for their primary means of mobility. We can use this data to identify common factors associated with prosthetic under-use, failure and/or abandonment. This information will be crucial to further research focused on prosthetic usage and the development of guidelines for prosthetic prescription that could be used by practitioners around the world to select the most appropriate assistive devices.

HERL PUBLICATIONS

Yang Y, Koontz AM, Triolo R, Cooper RA, Boninger ML, Biomechanical Analysis of Functional Electrical Stimulation on Trunk Musculature During Wheelchair Propulsion, **Neurorehabilitation and Neural Repair**, pp. 717-725, Vol. 23, No. 7, September 2009.

Collinger JL, Gagnon D, Jacobson J, Impink BG, Boninger ML, Reliability of Quantitative Ultrasound Measures of the Biceps and Supraspinatus Tendons, **Academic Radiology**, pp. 1424-1432, Vol. 16, No. 11, November 2009.

Dicianno BE, Bellin MH, Zabel AT, Spina Bifida and Mobility in the Transition Years, **American Journal of Physical Medicine and Rehabilitation**, pp. 1002-1006, Vol. 88, No. 12, December 2009.

Yang J, Boninger ML, Leath J, Fitzgerald SG, Dyson-Hudson TA, Chang M, Carpal Tunnel Syndrome in Manual Wheelchair Users with Spinal Cord Injury: A Multi-Center Study, **American Journal of Physical Medicine and Rehabilitation**, pp. 1007-1016, Vol. 88, No. 12, December 2009.

Gagnon D, Koontz AM, Brindle E, Boninger ML, Cooper RA, Does Upper Limb Muscular Demand Differ Between Preferred and Non-Preferred Sitting Pivot Transfer Directions in Individuals With Spinal Cord Injury?, **Journal of Rehabilitation Research and Development**, pp. 1099-1108, Vol. 46, No. 9, 2009.

Pyo J, Pasquina PF, DeMarco M, Wallach R, Teodorski E, Cooper RA, Upper Limb Nerve Entrapment Syndromes in Veterans with Lower Limb Amputations, **PM&R Journal**, pp. 14-22, Vol. 2, No. 1, January 2010.

HERL PUBLICATIONS

Jefferds AN, Beyene NM, Upadhyay N, Shoker P, Pearlman JL, Cooper RA, Wee J, Current State of Mobility Technology Provision in Less-Resourced Countries, **PM&R Clinics of North America**, pp. 221-242, Vol. 21, No. 1, February 2010.

Dicianno BE, Cooper RA, Coltallaro J, Joystick Control for Powered Mobility: Current State of Technology and Future Directions, **PM&R Clinics of North America**, pp. 79-86, Vol. 21, No. 1, February 2010.

Cooper RA, Cooper RM, Quality of Life Technology for People with Spinal Cord Injuries, **PM&R Clinics of North America**, pp. 1-13, Vol. 21, No. 1, February 2010.

Wang W, Collinger JL, Perez MA, Tyler-Kabara EC, Cohen LG, Birbaumer N, Brose SW, Schwartz AB, Boninger ML, Weber DJ, Neural Interface Technology for Rehabilitation: Exploiting and Promoting Neuroplasticity, **PM&R Clinics of North America**, pp. 157-178, Vol. 21, No. 1, February 2010.

Simpson RC, Koester HH, LoPresti EF, Research in Computer Access Assessment and Intervention, **PM&R Clinics of North America**, pp. 15-32, Vol. 21, No. 1, February 2010.

Laferrier JZ, Gailey R, Advances in Lower-Limb Prosthetic Technology, **PM&R Clinics of North America**, pp. 87-110, Vol. 21, No. 1, February 2010.

Ding D, Liu HY, Cooper RM, Cooper RA, Smailagic A, Siewiorek D, Virtual Coach Technology for Supporting Self-Care, **PM&R Clinics of North America**, pp. 179-194, No. 21, No. 1, February 2010.

Pasquina PF, Pasquina LF, Anderson-Barnes VC, Giuggio JS, Cooper RA, Using Architecture & Technology to Promote Improved Quality of Life for Military Service Members with Traumatic Brain Injury, **PM&R Clinics of North America**, pp. 207-220, Vol. 21, No. 1, February 2010.

Parsonnet J, Gruppuso PA, Kanter SL, Boninger ML, Required vs. Elective Research and In-Depth Scholarship Programs in the Medical Student Curriculum, **Academic Medicine** (Scholarly Concentrations Issue), pp. 405-408, Vol. 85, No. 3, March 2010.

Boninger ML, Troen P, Green E, Borkan E, Lance-Jones C, Humphrey A, Gruppuso P, Kant P, McGee J, Willochell M, Schor N, Kanter SL, Levine AS, Implementation of a Longitudinal Mentored Scholarly Project: An Approach at Two Medical Schools,

Academic Medicine (Scholarly Concentrations Issue), pp. 429-437, Vol. 85, No. 3, March 2010.

Dicianno BE, Wilson R, Hospitalizations of Adults with Spina Bifida and Congenital Spinal Cord Anomalies, **Archives of Physical Medicine and Rehabilitation**, pp. 529-535, Vol. 91, No. 4, April 2010.

Collinger JL, Fullerton B, Impink BG, Koontz AM, Boninger ML, Validation of Greyscale Based Quantitative Ultrasound in Manual Wheelchair Users, **American Journal of Physical Medicine and Rehabilitation**, pp. 390-400, Vol. 89,

No. 5, May 2010.

Rice I, Gagnon D, Gallagher J, Boninger ML, Handrim Wheelchair Propulsion Training Using Biomechanical Real Time Visual Feedback Based on Motor Learning Theory Principles, **Journal of Spinal Cord Medicine**, pp. 33-42, Vol. 33, No. 1, 2010.

Koontz AM, Brindle E, Kankipati P, Feathers D, Cooper RA, Design Features that Affect the Maneuverability of Wheelchairs and Scooters, **Archives of Physical Medicine and Rehabilitation**, pp. 759-764, Vol. 91, No. 5, May 2010.

Heiner CM, Improving the Lives of People with Disabilities, **Vanguard**, pp. 8-9, March/April 2010.

Cooper RA, Cooper RM, Kelleher AR, More Than Just Games, **Paraplegia News**, pp. 58-61, Vol. 64, No. 5, May 2010.

Laferrier JZ, Hot Topic: Assistive Technology, **Paraplegia News**, pp. 18-20, Vol. 64, No. 5, May 2010.



HERL Director Dr. Rory Cooper and Associate Medical Director Dr. Brad Dicianno were guest editors of a special Quality of Life Technology issue of Physical Medicine and Rehabilitation Clinics of North America (Vol. 21, No. 1, February 2010). Cover reprinted with permission of Elsevier. HERL Medical Director Dr. Michael Boninger was also guest editor of a special issue of Academic Medicine focusing on Scholarly Concentrations (Vol. 85, No. 3, March 2010). Cover used by permission of Academic Medicine - www.academicmedicine.org.

State of the Science Workshop: Care of the Combat Amputee

HERL and Walter Reed Army Medical Center's (WRAMC) Department of Physical Medicine and Rehabilitation joined forces to host the first State of the Science Workshop in 2005. With the continuous support of numerous organizations, this effort has grown into an entire symposia series, bringing workshops several times a year to WRAMC. The workshops deliver to healthcare professionals the latest "state of the science" information needed to treat people with disabilities, especially returning wounded soldiers.

Rehabilitation experts from the VA, Department of Defense, universities, and private industry have gathered at the workshops to lecture on topics such as polytrauma, traumatic brain injury, and regenerative medicine.

The latest workshop on April 16, 2010 not only united experts to speak on rehabilitating combat soldiers with amputations, but also marked the publication of a monumental textbook. At the end of 2009, the Borden Institute of the Army's Office of The Surgeon General published *Care of the Combat Amputee* as part of their Textbooks on Military Medicine series. This book was the published work of a three day symposium conducted in September 2007. Held at the Center for the Intrepid (CFI) at Brooke Army Medical Center (BAMC) in San Antonio, TX, the 2007 symposium united VA, civilian, and military experts in amputee care and rehabilitation to establish a consensus on standard of care issues and identify areas most needed for further clinical, technical, translational and developmental research. *Care of the Combat Amputee* was a joint VA/ Department of Defense (DoD) effort and was

Borden's first textbook to be written in this manner. The textbook is also one of the first pieces of medical literature to focus on the optimal treatment and rehabilitation of young combat related amputees.

Because of the numerous military service members who have sustained severe limb trauma as a result of the Global War on Terrorism, *Care of the Combat Amputee* will provide a much needed "road map" to provide focus for those treating these wounded service members. COL Paul Pasquina, MD, Medical

Director of the Amputee Program at WRAMC and HERL director Rory Cooper, Ph.D, were co-editors of the textbook.

The State of the Science Workshop on Care of the Combat Amputee opened with introductory remarks from Army Surgeon General LTG Eric B. Schoomaker, MD, PhD, WRAMC Commander COL Norvell V. Coats, MD, North Atlantic Regional Medical Command and WRAMC Commanding General MG Carla G. Hawley-Bowland, Borden Institute Director COL Martha Lenhart, MD, PhD, GEN (Ret) Fred Franks, and COL Pasquina. Later that morning, Acting VA Rehab Research & Development Deputy Director Patricia Dorn, Ph.D. joined the DoD leadership in recognizing individuals who's hard work and dedication brought *Care of the Combat Amputee* to fruition. Among those recognized for their efforts were Borden Institute Managing

Editor Joan Redding and the team of HERL graduate students who helped write and compile the textbook chapters and wrote the book's final chapter, summarizing the work and identifying areas for future research.



Top: Care of the Combat Amputee book signing. (L to R): GEN (ret) Fred Franks, Army Surgeon General LTG Eric Schoomaker, MD, PhD, Rory Cooper, PhD, COL Paul Pasquina MD, and WRAMC Commanding General MG Carla G. Hawley-Bowland.

Bottom: Justin LaFerrier, a physical therapist working at the VA Pittsburgh Healthcare System and HERL, spoke about rehabilitating lower extremity combat amputees back to high performance levels.



Several of the lead textbook authors returned to provide lectures in their area of specialty. Speakers covered the following topics in specific relation to service members with amputations: systems of care; military support systems; mental health; pain management; surgical considerations; medical complications; physical and occupational therapy; and future research.

Over 160 symposium attendees received a hard copy of *Care of the Combat Amputee* and had the opportunity to have their copy signed by LTG Schoomaker, MG Hawley-Bowland, GEN Franks, COL Pasquina, and Dr. Cooper. People lined up all the way from the WRAMC's building 2 back entrance, past Joel auditorium and into the lobby during the once in a lifetime book signing.

PVA graciously sponsored a lunch in the Red Cross building where the audience was also treated to the premiere of a new documentary, "Unbeaten." The film follows a group of wheelchair athletes for six days as they make their way in racing chairs and hand cycles in what is known as the toughest road race in the world, "Sadler's Alaska Challenge." The

course winds 267 miles though the mountain passes of Denali National Park between Fairbanks and Anchorage. The filmmaker Steven Barber and his crew also presented Dr. Cooper with the first "Unbeaten Award" for serving as a great role model for wounded, ill and injured Soldiers.

The State of the Science symposium on Care of the Combat Amputee was one of the most successful workshops to date; over 160 people gathered to hear the latest advances in care from these respected leaders in military amputee care. Information about future State of the Science Workshops can be found at www.herlpitt.org or by contacting Shelly Brown at 412-954-5287. People who would like to receive e-mails announcing future workshops can join HERL's workshop mailing list at

https://list.pitt.edu/mailman/listinfo/workshop_announcements. The next workshop is planned for September 2010, on robotics. Health care professionals can earn continuing education credits by attending the State of the Science Workshops.

For information about the movie "Unbeaten," visit www.UnbeatenTheMovie.com.

- Christine Heiner



Left: *The Care of the Combat Amputee* textbook display at WRAMC
Right: Filmmaker Steven Barber and Greg Strom present Dr. Cooper with the first "Unbreakable Award" and premiere their documentary on wheelchair racing during the lunch.

Perceived Barriers to Exercise Research Study

The Reeve-Irvine Research Center is conducting a research study to determine more details about the perceived barriers to exercise experienced by men and women with spinal cord injuries. The information gained from this study will provide valuable information to scientists who study how exercise influences different aspects of health specific to SCI. They need this information in order to better create exercise programs that a large majority of people with SCI can participate in and that are effective for their health. For more information please contact Dr. Kim Anderson at kanderso@uci.edu or call 949-824-0056. All information will be kept strictly confidential.

Please note this research study is not being conducted at the Human Engineering Research Labs. However, this is an online study for qualified participants living in any part of the U.S.





Human Engineering Research Laboratories



VA Center Of Excellence For Wheelchairs and
Associated Rehabilitation Engineering



University of Pittsburgh NIDRR Model Center
on Spinal Cord Injury



Part of
Quality of Life Technology Center
a National Science Foundation Engineering Research Center

Rory A. Cooper, Ph.D.
Director

Michael L. Boninger, M.D.
Medical Director

Jonathan Pearlman, Ph.D.
Associate Director of Engineering

Alicia Koontz, Ph.D., RET
Associate Director for Research Capacity Building

Brad Dicianno, MD
Associate Medical Director

Mailing Address:
VA Pittsburgh Healthcare System
7180 Highland Drive
Building 4, 2nd Floor East Wing, 151R-1
Pittsburgh, Pa, 15206

Phone: 412-954-5287
Fax: 412-954-5340

E-mail any comments, corrections, or questions concerning
the newsletter to the editor, Christine Heiner at:
Email: heinercm@pitt.edu

www.herlpitt.org

How to subscribe to the HERL Newsletter:
Electronic mailing list: visit
<https://list.pitt.edu/mailman/listinfo/herlnewsletter>
Print mailing list: Please call
Christine Heiner at 412-954-5287
or e-mail heinercm@pitt.edu
All newsletters are archived on our website
www.herlpitt.org.

ARE YOU INTERESTED IN ASSISTIVE TECHNOLOGY RESEARCH?

The Human Engineering Research Laboratories (HERL) is recruiting individuals interested in participating in research studies for the **ASSISTIVE TECHNOLOGY REGISTRY**.

If you would like to be notified of research studies related to assistive technology for which you may be eligible to participate, contact The Human Engineering Research Laboratories and join the Assistive Technology 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 assistive technology (e.g. wheelchair, scooter, prosthesis, etc) please contact a Clinical Coordinator at (412) 954-5287 or herlregistry@shrs.pitt.edu VAPHS, 7180 Highland Drive, 151R1-H, Pittsburgh, PA 15206

www.herlpitt.org