



HERL Quarterly Newsletter

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HERL AND WRAMC JOIN FORCES

HERL recently began a collaborative relationship with Walter Reed Army Medical Center (WRAMC) to promote research, translate research into clinical practice, and provide research education. The ultimate goal of this partnership is to start joint HERL-WRAMC research and development activities to improve coordination and provide state-of-the-science assistive technology services between and within the VA and Department of Defense (DoD).



LTC Paul F. Pasquina, MD, Chief of PM&R Service at WRAMC, speaks at the opening of the January 14 workshop.

Walter Reed Army Medical Center (WRAMC) is the Army's primary care provider for ill or injured service members who are evacuated to the medical center for specialty treatment. WRAMC sends its own staff into harm's way to provide their quality care. By the end of 2004, the medical staff at WRAMC has treated more than 4,100 wounded, ill or injured soldiers from both Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF), including over 1,050 whose wounds or injuries resulted from enemy action. Many of the battle field casualties are soldiers who have had amputated limbs. There have been about 84 medical evacuations from the theatre of war to WRAMC for spinal cord or column injuries. Army physicians nationally recognized for their skill, training and experience lead Walter Reed's departments and services.

Because of the high number of soldiers who have had to have limbs amputated, Congress appropriated funds for a

specialty Amputee Care Program and construction of an Amputee Patient Care Center. The Amputee Care Program is under the medical directorship of LTC Paul F. Pasquina, MD, physiatrist and Chief of the Physical Medicine and Rehabilitation (PM&R) Service. The Amputee Care Program is supported by PM&R, orthopedic surgery, occupational and physical therapy, social work, psychiatry, nursing, prosthetics and orthotics, anesthesiology, and Department of Veterans Affairs counselors.

HERL director Rory A. Cooper, Ph.D. and Dr. Pasquina met in December, 2003 when the VA Prosthetics and Special Disabilities Populations Advisory Committee made a visit to Ward 57 at WRAMC. Orthopedics and rehabilitation services have responsibility for Ward 57. They met again in July of 2004 during congressional testimony about the progress of medical rehabilitation of OEF and OIF soldiers and the possible use of research available from the VA Rehabilitation Research & Development Centers. In

October, 2004, they met again at the White House Conference on Assistive Technology and the New Freedom Initiative sponsored by the VA and the White House Office of Science and Technology. In November, 2004 Dr. Cooper presented "Grand Rounds" for WRAMC PM&R. This led to the idea of holding a more comprehensive workshop on wheelchairs and seating, as many of the soldiers being treated by WRAMC-PM&R are provided wheelchairs. In December, 2004, Drs. Cooper and Pasquina met and communicated frequently to plan the workshop.



The workshop presenters. (L to R): Erik Wolf, MS, Ph.D. candidate, Alicia Koontz, Ph.D., RET, Rory A. Cooper, Ph.D., Rosemarie Cooper MPT, Michael Boninger, M.D., LTC Paul Pasquina, MD.

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CURRENT RESEARCH ABSTRACTS

The GAME^{Cycle} Exercise System: A Comparison to Standard Ergometry

Shirley G. Fitzgerald, Ph.D., Rory A. Cooper, Ph.D., Tricia Thorman, MOT, Rosemarie Cooper, MPT,
SongFeng Guo, PhD, Michael L. Boninger, MD

Full Article Appeared in *Journal of Spinal Cord Medicine*, Vol. 27, No. 5, pp. 453-459, 2004.

Purpose of work: Physical activity is well established to be beneficial to health. For individuals who use wheelchairs, a regular exercise program might not be available or may be too difficult to participate in physically and/or psychologically. Many exercise devices and regimes can be boring. The goal was to develop a device that made exercise more exciting. A person may have more motivation to exercise or may exercise for a longer period of time yielding increased energy expenditure when an activity is more exciting. To this end, our laboratory developed an interface between an arm cycle and a computer game that allows the user to control game play on the screen as if using a joystick. This device was called GAME^{Cycle}. The purpose of this study was to determine whether the GAME^{Cycle} would elicit an exercise effect similar to arm cycle.

Subjects/Procedures: Thirteen individuals who used



The GAME^{Cycle} Exercise System

wheelchairs participated in the study. Subjects were asked to exercise for two separate, nineteen-minute sessions. For one session, a GAME^{Cycle} system was used; for the other session, the same arm cycle was used, but without the computer game being played. Data on heart rate, oxygen consumption, and the subjects' feelings regarding amount of exercise they were doing was collected.

Results: Significant differences for oxygen consumption were found between playing the game and not playing the

game. No differences were found between the two trials with respect to the subjects' feelings of exercising.

Relevance to Wheelchair Users: GAME^{Cycle} appears to be similar in nature to amount of energy that used to exercise as compared to an arm cycle. The use of outside influences (such as game play) may increase the desire to exercise, which would ultimately benefit one's health.

-Shirley Fitzgerald, Ph.D.

Assessing the Influence of Wheelchair Technology on Perception of Participation in Spinal Cord Injury

Eliana S.Chaves, M.S., Michael L. Boninger, M.D., Rosemarie Cooper A.T.P

Shirley G. Fitzgerald, Ph.D., David B.Gray, Ph.D., and Rory A. Cooper, PhD

Full Article appeared in *Archives of Physical Medicine and Rehabilitation* (Model Systems Issue),
Vol. 85, No. 11, pp. 1854-1858, November 2004.

Purpose of Work. Factors related to the wheelchair, impairment, and environment that affect perception of participation of individuals with spinal cord injury (SCI) were investigated. Activities performed in three settings included the home, community, and transportation.

Subjects/Procedures. Seventy wheelchair users with SCI who used wheelchairs participated in the study; their average age was 41 years and average years since spinal cord injury was 14. Twenty nine percent had tetraplegia and had 38% paraplegia. Thirty seven individuals from Pittsburgh (Pitt) and thirty three from St. Louis (SL) completed a written survey of assistive technology use in daily activities.

Results. The wheelchair was most often cited as limiting participation in each of the three settings, followed by physical impairment and then the environment. Twenty one percent of individuals with paraplegia reported significantly more pain as a limiting factor for their transportation use ($p = .047$) than individuals with

tetraplegia (3%). A higher percentage of (SL=24% Pitt=5% $p = .025$) individuals from SL reported wheelchair seating as a perceived limiting factor; whereas for transportation, SL participants (SL=15% Pitt=3% $p = .061$) were more likely to report fatigue to be a limiting factor when leaving home. SL individuals were more likely to indicate that wheelchair seating (SL=24% Pitt=5% $p = .028$), social attitudes (SL=18% Pitt=0% $p = .007$) and self-concept (SL=15% Pitt=0% $p = .015$) were limiting factors. For factors affecting transportation, a greater number of participants from SL reported social attitudes (SL=15% Pitt=0% $p = .017$) as a limiting factor.

Relevance to wheelchair users. For the individuals who use them, the wheelchair is their most important mobility device, yet the one most associated with barriers. Providing a wheelchair that fits well and is simple to operate without addressing environmental access may limit the potential benefits of the devices. Similarly, an accessible environment is of no benefit if the equipment is difficult for the user to operate.

-Eliana Chaves, MS

CURRENT RESEARCH ABSTRACTS

Demographic and Socioeconomic Factors Associated With Disparity in Wheelchair Customizability Among People With Traumatic Spinal Cord Injury

Peter Cody Hunt, MPH; Michael L. Boninger, MD; Rory A. Cooper, PhD;

Ross D. Zafonte, DO; Shirley G. Fitzgerald, PhD

Full Article Appeared in *Archives of Physical Medicine and Rehabilitation* (Model Systems Issue), Vol. 85, No. 11, pp. 1859-1864, November 2004.

Purpose of the Work. This study determined if a standard of care for wheelchair provision exists within the National Model Spinal Cord Injury Systems (NMSCIS) and if wheelchair users of minority descent and from low socioeconomic backgrounds have difficulty obtaining customizable wheelchairs, wheelchairs with adjustable design features.

Subjects. Four hundred and twelve individuals with traumatic spinal cord injury (SCI), who use a wheelchair over 40 hours a week participated in this study.

Procedures. Participants were recruited from the current 16 NMSCIS, which provide acute and rehabilitative care for individuals with SCI. The NSCIMS are funded by the Department of Education and maintain the world's largest database on SCI rehabilitation. Participants completed an annual follow-up questionnaire, which included information on age, race, education, income, employment status, health care insurance, wheelchair funding sources, and

manufacturer and model of wheelchairs.

Results. Ninety-seven percent of manual wheelchair users and 54% of power wheelchair users had customizable wheelchairs. No power wheelchair user received a wheelchair without programmable controls. Minorities with low socioeconomic backgrounds (low income, Medicaid/Medicare recipients, less educated) were more likely to have standard manual and standard programmable power wheelchairs. Older individuals were also more likely to have standard programmable power wheelchairs.

Relevance to Wheelchair Users. The standard of care for manual wheelchair users with spinal cord injury is lightweight and customizable. The standard of care for power wheelchair users has programmable controls. Unfortunately socioeconomically disadvantaged individuals were less likely to receive customizable wheelchairs.

-Peter Cody Hunt, MPH

Technical Perspective: Evaluation of Selected Sidewalk Pavement Surfaces for Vibration Experienced by Users of Manual and Powered Wheelchairs

Rory A Cooper, PhD, Erik J Wolf, MS, Shirley G Fitzgerald, PhD, Annmarie Kelleher, OTR/L, William A Ammer, BS, Michael L Boninger MD, Rosemarie Cooper, MPT ATP

Full Article Appeared in the *Journal of Spinal Cord Medicine*, Vol. 27, No. 5, pp. 468-475, 2004.

Purpose of Work: The goal was to record vibrations while traveling over selected sidewalk surfaces in an electric powered wheelchair (EPW) and a manual wheelchair (MW). This study also examined how much effort was required to cross each surface in a MWs. The study should provide support for determining the criteria for defining a wheelchair pedestrian access route that does not require excessive propulsive work, or expose people using wheelchairs to potentially harmful vibrations.

Subjects and Procedures: Six different sidewalk surfaces were tested, including a poured concrete surface that acted as the norm, and five interlocking concrete and brick surfaces of varying bevels (0 mm, 2 mm, 4 mm, and 8 mm) and patterns (90 degree herringbone and 45 degree herringbone pattern). Ten unimpaired individuals used a MW equipped with SMART^{Wheels}, and an EPW during data collection. Vibration levels were measured at the seat and



HERL investigators compared vibration levels during manual and power wheelchair propulsion over these six different sidewalk surfaces.

the footrest of both wheelchairs, using two accelerometers, and mechanical work was determined from the SMART^{Wheels}.

Results: The surface with the highest bevel (8 mm) produced significantly higher vibrations than the rest of the surfaces. The other surfaces showed either no significant difference or a lower vibration level than the standard poured concrete surface. No significant differences were found for the work to propel over the sidewalks.

Relevance to Wheelchair Users:

Surfaces other than poured concrete can be used for pedestrian access routes without causing higher amounts of vibrations to wheelchair users. Additionally, no extra work is required to propel over interlocking concrete surfaces and will not produce higher strains on the upper extremities of the wheelchair user.

-Erik Wolf, MS

HERL IN THE MEDIA

PVA Newsroom, November 2004: PVA Member Rory Cooper, Appointed to be First Holder of FISA Foundation/PVA Chair for Rehab Engineering

<http://www.pva.org/newsroom/FeaturesArchive/2004/f04030.htm>

Pittsburgh Post-Gazette, Dec. 5, 2004, Page C-1:

'Legos Up' on the Competition

Pittsburgh Tribune-Review, Dec. 5, 2004:

Building Blocks of the Future

Pitt Chronicle, Dec. 6, 2004, Page 3: Awards and More:

Rory Cooper

University Times, Thurs. Dec. 9, 2004, Page 22: People of the Times

Pitt Chronicle, Monday January 10, 2005, Page 11:

Pitt in the News: Shirley Fitzgerald

Walter Reed Army Medical Center Newsletter, January 2005: Walter Reed Workshop Demonstrates Wheelchair Challenges, Solutions

Walter Reed Workshop Demonstrates Wheelchair Challenges, Solutions

VA RR&D Update, Winter 2005, Page 2: WaRE Investigators Present at Walter Reed

PVA Newsroom, January 2005: Wheelchair Research, Mobility Training Workshop Will Help Newly Disabled Troops at Walter Reed Army Medical Center

<http://www.pva.org/newsroom/PR2005/pr05001.htm>

CURRENT EVENTS/ANNOUNCEMENTS

The 2005 International Conference on Posture and Wheeled Mobility will be taking place in Exeter in the South West of England 11-15th April, 2005. The underlying theme is to examine posture and mobility from a holistic point of view. What do individuals need and want to do with their lives, and how can their postural management and wheeled mobility systems answer these needs in an integrated way?

The first day of the conference is dedicated to half day and full day instructional courses. The next three and a half days are dedicated to five tracks addressing specific areas of interest in posture, and wheeled mobility. These streams concentrate on Posture Management, Users' Needs, Wheeled Mobility, Tissue Integrity, and Service Delivery. Each track has a plenary session dedicated to it, as well as five parallel sessions spread out through the

HERL PUBLICATIONS



Heiner CM, Stankovic PL, Decade of Excellence,

Paraplegia News, pp. 47-54, December 2004.

Wolf EJ, Cooper RA, DiGiovine CP, Boninger ML, Guo S, Using the Absorbed Power Method to Evaluate Effectiveness of Vibration Absorption of Selected Seat Cushions During Manual Wheelchair Propulsion, **Medical Engineering and Physics**, Vol. 26, No. 9, pp. 799-806, November 2004.

Fitzgerald SG, Cooper RA, Thorman T, Cooper R, Guo S, Boninger ML, The GAME^{Cycle} Exercise System: A Comparison to Standard Ergometry, **Journal of Spinal Cord Medicine**, Vol. 27, No. 5, pp. 453-459, 2004.

Cooper RA, Wolf EJ, Fitzgerald SG, Kelleher AR, Ammer WA, Boninger ML, Cooper R, Technical Perspective: Evaluation of Selected Sidewalk Pavement Surfaces for Vibration Experienced by Users of Manual and Powered Wheelchairs, **Journal of Spinal Cord Medicine**, Vol. 27, No. 5, pp. 468-475, 2004.

Kwarciak AM, Cooper RA, Ammer WA, Fitzgerald SG, Boninger ML, Cooper R, Fatigue Testing of Selected Suspension Manual Wheelchairs Using ANSI/RESNA Standards, **Archives of Physical Medicine and Rehabilitation**, Vol. 86, No. 1, pp. 123-129, January 2005.

week. The conference details are available on the website www.mobility2005.org where you are invited to book your attendance. Please go to this site to see the presenters' abstracts as they are submitted, and to see the most recent version of the program.

If you know of a current event or have an ad that you would like to post in the HERL Quarterly Newsletter, please contact Christine Heiner at (412) 365-4854 or by e-mail at heinercm@pitt.edu

Wheelchair and Scooter users! When you visit new places, do you often feel like you are sailing off into the unknown? Do you wonder if you will actually reach your destination? A research team at the University of California at Santa Barbara wants to learn about your travel experiences, the information you use to plan your trips, and the problems you are encountering.

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Current Events/Announcements

(continued from page 4)

To contribute to this work, please complete an anonymous online survey and visit <http://research.survey.ucsb.edu/access/>

Contact Person:

Andrea Nuernberger, Ph.D. student and co-investigator
(anuernbe@umail.ucsb.edu)

A new employee has joined the HERL front office staff! Amie Struble has been of invaluable assistance during the last few months, while HERL has been understaffed. If you have called HERL recently, you have probably heard Amie's friendly voice on the line. Amie has agreed to work with us for a while, assisting with numerous clerical duties such as grant preparation, data entry, participant payments, and continuing education. Amie has also contributed several articles to this newsletter as well as our last issue.

HERL will be at the next Abilities Expo on April 15-17, 2005 at the New Jersey Convention and Expo Center in Edison, NJ. We will have a table/display as well as HERL faculty/staff in attendance to educate people about our research facilities and about the studies we conduct.

To learn more, visit the Abilities Expo website at <http://nyc.abilitiesexpo.com>. On-site admission to the expo is \$5; children under 12 are free.

Agency Spotlight

The National Spinal Cord Injury Association (NSCIA) is a non-profit organization developed to help those individuals with spinal cord injuries and diseases. The NSCIA was founded in 1948 and now has over 40 chapters and support groups throughout the United States. Their mission is to "enable people with spinal cord injury and disease to achieve their highest level of independence, health, and personal fulfillment by providing resources, services, and peer support."

Local and nationally supported activities are available for NSCIA members, such as support groups where individuals are connected across the country to provide motivation and support to each other. A support group called "In Touch with Kids" specifically designed for children 18 years of age and younger is also available. "In Touch with Kids" allows the children to be in touch with other children going through the same experiences. It also allows the parents to communicate with each other re-

Featured Student: Brad Impink



Brad Impink

Brad began working as an undergraduate intern at the Human Engineering Research Laboratories during the summer of 2001. At this time, he worked with Dr. Shirley Fitzgerald on a wheelchair maintenance study. Brad then graduated with his Bachelor of Science degree in Engineering, concentration in Bioengineering, from the University of Pittsburgh in the spring of 2002. After graduating he continued

working at HERL under the direction of Dr. Michael Boninger. Brad has since been working in the biolab on the CULP SCI study along with the "Ultrasonographic Evaluation of the Median Nerve in Manual Wheelchair Users" study.

Brad has played an active role at HERL serving as a lead student researcher on several research studies, recruiting subjects for studies, participating in the National Veterans Wheelchair Games twice, and serving as a mentor in the Tech-Link program. In October of 2004 he was awarded with the National Science Foundation's IGERT Fellowship in Assistive Technology. Currently Brad is pursuing a Ph.D. in Bioengineering at the University of Pittsburgh.

-Amie Struble

garding issues of raising a child with a spinal cord injury or disease.

The NSCIA works with local and national officials to promote and encourage better programs and services for those individuals with spinal cord injury and diseases. They are committed to improving the care of individuals with spinal cord injuries through education; this is being accomplished by educating professionals on proper methods of rehabilitation. Public education programs also exist which concentrate on prevention of spinal cord injuries. NSCIA funds research with the aim of developing a cure for spinal cord injury and disease.

NSCIA membership is open to anyone. Membership is free to individuals with spinal cord injuries. For more information about membership, or the NSCIA, please visit their website at www.spinalcord.org.

-Amie Struble

(continued from page 1)

This workshop, entitled “State-of-the-Science Workshop: Wheelchair Research and Clinical Practice,” was at WRAMC in Washington, DC on January 14, 2005. About 120 people attended the conference, including staff from WRAMC, Bethesda Naval Medical Center, VA, National Institutes of Health, Agency for Healthcare Research and Quality, and the National Institute for Disability and Rehabilitation Research. The workshop was simultaneously broadcast through the WRAMC education services, and medical centers in Texas, Georgia, and New York participated remotely. The entire workshop was videotaped and will be made available to VA and DoD facilities for educational purposes. The presentations are posted on the HERL web-site (www.herlpitt.org).

The Workshop was kicked-off by a welcome by Dr. Pasquina, who gave an overview of the services provided by PM&R and affiliated services at WRAMC. HERL Medical Director Michael L. Boninger, MD gave a presentation about training of physiatrists and other rehabilitation professionals in research and assistive technology service delivery. Alicia M. Koontz, PhD, RET, a HERL research scientist, was the second speaker and she presented manual wheelchair selection and fitting as well as transfers. HERL Clinical Coordinator Rosemarie Cooper, MPT, ATP followed and spoke on pressure management and seating systems. Erik J. Wolf, MS, a HERL Ph.D. candidate, was the final speaker who addressed electric powered wheelchair research and clinical practice.

Research coordinator Paula Stankovic and doctoral student Jon Pearlman from HERL also volunteered for the workshop, coordinating registration/continuing education paperwork for the seminar and assisting with the slalom competition later that afternoon.

The Workshop adjourned for lunch, which was provided to all of the participants by the Paralyzed Veterans of America. Dr. Cooper presented during lunch, providing an overview of the VA Rehabilitation Research and Development Centers.

For the afternoon’s slalom and wheelchair skills training



(L to R): Paula Stankovic, Erik Wolf, Jon Pearlman, and Dr. Cooper from HERL were integral in coordinating the workshop activities.

session, HERL had constructed several obstacles, such as stairs, a horizontal ladder, ramps, platforms, doorway, a large hemp rope, and a piece of plywood with obstacles screwed to it. Rosemarie Cooper explained each of the obstacles and the importance of training mobility skills. Rory Cooper went through the course and described how to maneuver through each obstacle. He was then timed while racing through the course, to many hoops, holders and shouts of “Hooah”. The wounded soldiers were impressed and motivated to overcome these obstacles to daily living.



The slalom/wheelchair training skills course

The need to teach and learn “wheelie” skills was emphasized when working with the young athletic patients often being seen at WRAMC and other DoD medical facilities. The course was modified for power wheelchairs and the power chair users discovered that many obstacles can be overcome by using an electric powered wheelchair. After the wheelchair skills demonstrations, people

(including OIF/OEF patients) were paired to learn and teach each other manual and powered mobility skills. After gaining greater experience, some of the patients and clinicians attempted the slalom course, achieving a greater appreciation for what can be done in a wheelchair and the importance for proper selection and fitting.

A second HERL/WRAMC “State-of-the-Science Workshop” focusing on Traumatic Brain Injury is scheduled to be held at WRAMC on April 22, 2005. Details and registration for the workshop will be available on www.herlpitt.org.

-written by
Christine Heiner
and Rory Cooper,
Ph.D.



Dr. Cooper visits with wounded soldiers in the

FEATURED STAFF MEMBER: James Joseph

James Joseph is the Administrative Assistant at the Human Engineering Research Laboratories. He has been working at HERL since June of 2004. Jim performs many activities to facilitate the daily operations of the lab such as processing participant payments, parts and supplies procurement, and the general upkeep of office machines. Jim also works with computer software installation and maintenance, along with server and workstation upgrades.

Jim is a retired Marine Corps Gunnery Sergeant. He served as the Electro-Optical repair chief and also a Breach Guide for the Direct Support Group 2, 1st FSSG, in Saudi Arabia during Operation Desert Storm. In his 22 year career



Jim Joseph

in the military, Jim has been stationed many places throughout the world. His favorite place was Okinawa, Japan, where he served as the platoon shop chief. Jim most enjoyed his service time when he was managing shop facilities and instructing young marines. Jim has received many medals and decorations including the Kuwait Liberation Medal.

Jim is currently attending Point Park University majoring in Information Technology. He expects to graduate in December, 2005 with a Bachelor of Science degree. Jim has a wife, Lauren, and six children ranging in age from 6-18 years old.

-Amie Struble

HERL in the Community

The Tech-Link Lego-League Robotics Competition concluded on December 4, 2004 at the National Robotics Engineering Consortium at Carnegie Mellon University. Both HERL teams brought home trophies for software design and group presentation.

On Saturday, December 11, 2004, HERL faculty, staff, and their families teamed up with the Keystone Paralyzed Veterans of America to sing Christmas Carols and visit with Veterans at the Aspinwall Division of the VA Pittsburgh Healthcare System.



Volunteers from HERL participated in the HOPE Network/Healthsports Adapted Snow Ski Classic at Hidden Valley Ski Resort on

January 24-26, 2005. This was the event's 23rd consecutive year, where skiers of all abilities and levels of experience join for fun in the snow.

News from the Department of Physical Medicine and Rehabilitation

Faculty at the Department of Physical Medicine and Rehabilitation, University of Pittsburgh, recently had a journal paper published:

Amy K. Wagner, MD; Anthony Fabio, PhD; Ava M Puccio, RN, MSN; Ronald Hirschberg, MD; Wei Li, PhD; Ross D. Zafonte, DO; Donald W. Marion, MD: Gender Associations with Cerebrospinal Glutamate and Lactate/Pyruvate Levels After Severe Traumatic Brain Injury. **Critical Care Medicine**, Vol. 33, No. 2, pp. 407-413, February 2005.

RECENTLY FUNDED HERL GRANTS

“Lightweight, Durable, Adjustable Composite Backrest.” Principle Investigator: Todd Hargroder. National Institute of Disability and Rehabilitation Research (NIDRR), September 1, 2004—February 28, 2005, \$75,000.



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the newsletter to the editor, Christine Heiner at:
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VA Center Of Excellence For
Wheelchairs and Associated
Rehabilitation Engineering

University of Pittsburgh Model
Center on Spinal Cord Injury

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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 Anmarie** for more information.

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