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# REHAB

# Road Map

With input from research experts, this symposium's work will result in a crucial textbook for combat-amputee care.

*by Christine Heiner; Rory Cooper, PhD; and LTC Paul F. Pasquina, MD*

## Numerous military

servicemembers have sustained severe limb trauma as a result of the Global War on Terrorism. To date, the Army Medical Department has provided medical, surgical, and rehabilitative care to more than 700 military servicemembers with amputations.

Most of these individuals have been treated at Walter Reed Army Medical Center (WRAMC), in Washington, D.C., or Brooke Army Medical Center (BAMC) in Fort Sam Houston, Tex. By caring for these patients, the medical staff at these institutions have learned valuable lessons and helped establish new paradigms in medical rehabilitation.

Unfortunately, little medical literature focuses on the optimal treatment and rehabilitation of young men and women who have combat-related amputations. The majority of clinical studies has focused on the care of older individuals with amputation as the result of complications from vascular disease or dia-

betes. Combat-specific amputations, especially from blast injuries, are very different than the trauma-related amputations seen in the civilian community. Combat wounds often are associated with multiple co-morbid injuries such as burns, traumatic brain injury (TBI), spinal-cord injury (SCI), sensory loss, or extensive soft-tissue trauma. Additionally, the psychosocial aspects of injury during military service are very unique. To help establish effective and cutting edge treatment in this patient population, more research is needed.

**RIGHT:** The symposium's success resulted from behind-the-scenes work by (back row, from left) Christine Heiner; LTC Jennifer Menetrez; Kathy Rasmussen; Col. Rebecca Hooper; Amy Donovan; LTC Paul Pasquina, MD; Col. Charles Scoville; (front row, from left) Paula Stankovic, Dr. Rory Cooper, and Jennifer Lee-Hooper.





The Center for the Intrepid, at Brooke Army Medical Center in Fort Sam Houston, Tex., is a focal point for development, testing, and exploration of technology and treatment strategies for military personnel with severe injuries.







Symposium attendees were impressed by the facility's Computer Assisted Rehabilitation Environment (CAREN), which has a 300° screen that displays a variety of "virtual realities" such as a driving simulator.

In support of the nation's commitment to advance treatment and promote research for injured military servicemembers, Congress and the Department of Defense (DOD) are working to build state-of-the-world research and treatment facilities at BAMC and WRAMC. The Center for the Intrepid—which opened in January 2007 at BAMC—was funded by more than 600,000 Americans through the Intrepid Fallen Heroes Fund. This facility serves as a focal point for the development, testing, and exploration of advanced technology and treatment strategies for military

servicemembers and veterans with severe injuries, primarily limb loss.

To ensure the success of these unique clinical and research programs, the Department of Veterans Affairs (VA) and military care community needs a "road map" to provide focus for their efforts and priorities. With this mission in mind, Dr. Rory Cooper, director, VA/University of Pittsburgh Human Engineering Research Laboratories (HERL), and LTC Paul Pasquina, MD, medical director of WRAMC's Amputee Program, organized "Rehabilitation of the Combat Amputee—Consen-



HERL Director Rory Cooper, PhD, presents the meeting's final session, on assistive technology.



sus Conference and Creating a Road Map for the Future," a three-day symposium conducted at the Center for the Intrepid on September 17–19, 2007.

The event united VA, civilian, and military experts in amputee care and rehabilitation to help establish a consensus on standard of care issues. It also was created to help identify areas most needed for further clinical, technical, translational, and developmental research.

The symposium's work will be written into a textbook, *Rehabilitation of the Combat Amputee*, to be published by the Borden Institute as part of its Textbooks on Military Medicine (TMM) series. Borden Institute, of the Office of The Surgeon General, Department of the Army, has published TMM since 1989.

The series provides a comprehensive, multi-volume treatise on the art and science of military medicine as practiced by the United States armed forces. The books integrate lessons learned in past wars with current principles and practices of military medical doctrine. *Rehabilitation of the Combat Amputee*, a joint VA/DOD effort, will be Borden's first textbook written in this manner.

## High-powered Speakers

Eighteen experts in key research areas lectured at the symposium. They included engineers, physiatrists, therapists, surgeons, historians, psychologists, neurologists, prosthetists, audiologists, and experts in pain management and veterans' benefits. The speakers came from VA, DOD, universities, and private companies and institutions. The Paralyzed Veterans of America (PVA); Ossur; and Otto Bock HealthCare, LP, sponsored working lunches over the three-day event.

The symposium began with opening remarks from Arnold Fisher, who established the Intrepid Fallen Heroes Fund to provide funds to the families of servicemen and -women who have given their lives fighting the War on Terror. This fund completed the construction of the Center for the Intrepid in January 2007.

Jeff Reznick, PhD, director, Institute for the Study of Occupation and Health, kicked off the first day by presenting his historical perspective on rehabilitation of combat amputees. Steven Scott, MD, medical director, Tampa VA Polytrauma Center, provided three comprehensive,

# Paying it Forward

The Puget Sound VA (Seattle) is developing training materials for a polytrauma "peer visitation" program modeled after one created by the Amputee Coalition of America (ACA) and successfully put into action at Walter Reed Army Medical Center (WRAMC). At that site, more than 100 "peer visitors"—many of whom are military amputees—have completed one-day training, undergone evaluation and certification, and visited with more than 500 Operation Iraqi Freedom/Operation Enduring Freedom (OIF/OEF) veterans who have lost limbs.

Pat Isenberg, ACA chief operating officer and author of the group's peer-visitation training materials, says the program has been well-received at WRAMC, the Department of Defense facility where the majority of severely wounded OIF/OEF soldiers undergo treatment and rehabilitation. Peer visitation ranked second only to overall rehab in a recent WRAMC satisfaction survey covering 32 interventions, and ACA has received much positive anecdotal feedback.

"Our most active peer visitors talk about how rewarding it is for them to see the progression of these injured young people from the ICU through painful rehab to standing and then to walking on their first prostheses," says Isenberg. "I think one significant marker of the power of these interactions is the number of injured people who want to become peer visitors so they can give back as a way of paying it forward."

*Excerpted from VA Research Currents, November 2007. Used with permission.*



VA polytrauma care patients, such as this veteran at the Tampa VA Medical Center, may benefit from a research project aimed at training peer visitors.





Major Scott Shawen and Human Engineering Research Laboratories (HERL) graduate student Jennifer Mercer discuss chapters from the Surgical Management and Planning group.

back-to-back presentations on blast injuries, VA's care system for patients with multiple traumas, and protracted war implications. VA Seamless Transition Program Manager Col. Nicole Keese covered VA benefits and support groups.

Afternoon lectures on lower-limb amputee therapy were by Robert Gailey, PhD, associate professor of Physical Therapy at the University of Miami, and Col. Barbara Springer, PhD, chief, Physical Therapy Service at WRAMC. Maj. Lisa Smurr, MS, chief, Occupational Therapy, Schofield Barracks Health Clinic in Hawaii; and Sandra Hubbard, PhD, research health scientist, Rehabilitation Outcomes Research Center North Florida South Georgia VA, discussed upper-limb

amputee therapy. Todd Kuiken, MD, PhD, director, Neural Engineering Center for Artificial Limbs, provided an update on the Revolutionary Prosthetics Program.

The second day began with a presentation from Maria Mouratidis, PhD, head of the Traumatic Stress and Brain Injury National Naval Medical Center Mental Health Directorate, and Louis French, PhD, director, WRAMC Traumatic Brain Injury Service, who talked about traumatic brain injuries (TBIs). Col. Mark Bagg from the Center for the Intrepid and Douglas Smith, MD, associate professor, Orthopaedics and Sports Medicine, University of Washington, lectured on special surgical considerations for amputees.

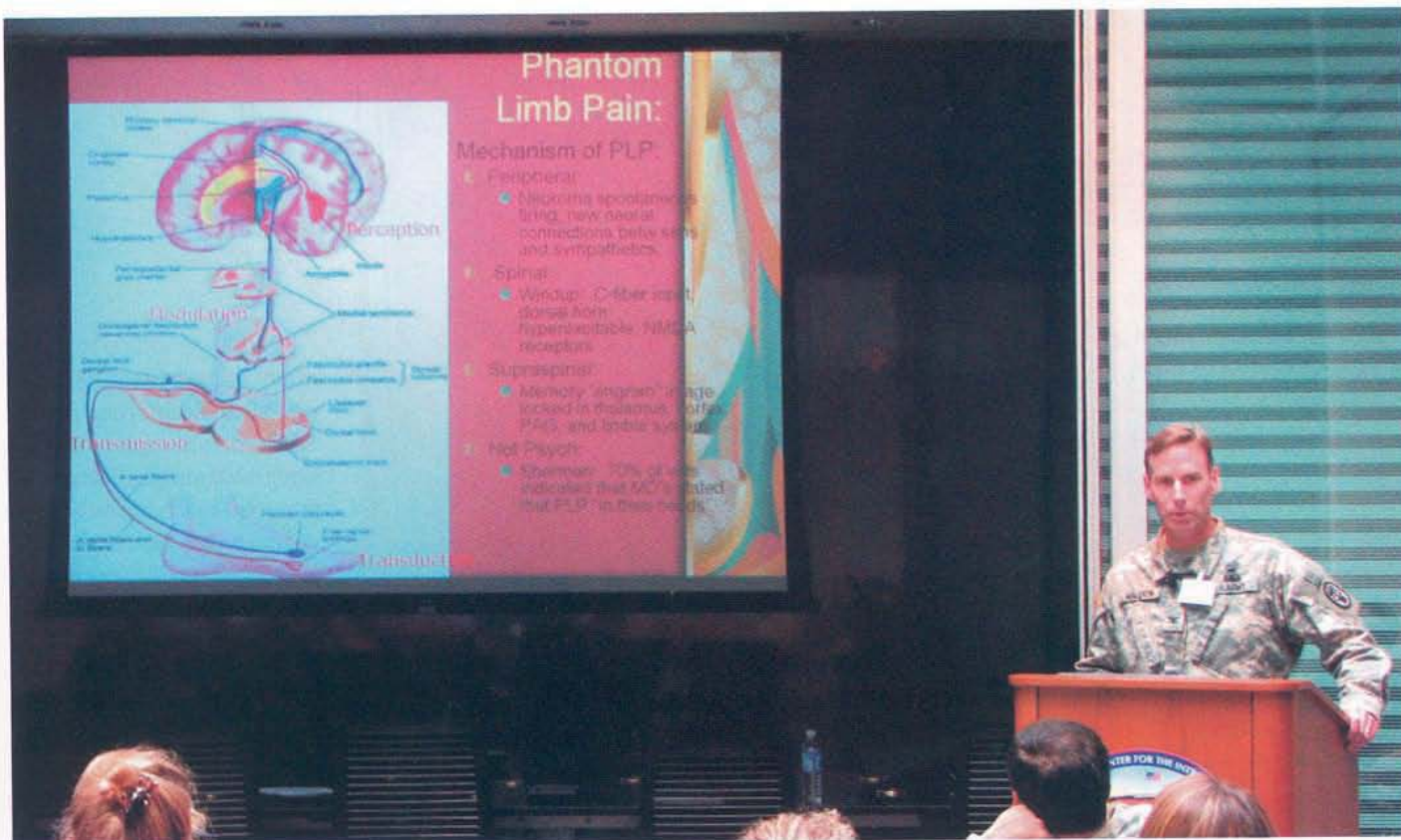
Maj. Thane McCann, MD, BAMC staff psychiatrist, presented on special medical considerations. Lecturing on mental-health care was Harold Wain, PhD, chief, Psychiatry Consultation Liaison Service, WRAMC.

The afternoon session began with a lecture on pain management by Commander Jack Tsao, MD, PhD, assistant professor, Neurology and Neuroscience, Uniformed Services University of the Health Sciences; and Randall Malchow, MD, chief, Regional Anesthesia and Acute Pain Management Section. Stephen Fausti, PhD, director, VA National Center for Rehabilitative Auditory Research, presented on hearing impairment and treatment.



A breakout group reviews its chapters for the book *Rehabilitation of the Combat Amputee*.





Randall Malchow, MD, chief, Regional Anesthesia and Acute Pain Management Section, lectures on pain management.

The symposium's final day started with Center for the Intrepid Chief Prosthetist John Ferguson's presentation on lower-limb prosthetics. John Miguelez, president and senior clinical director, Advanced Arm Dynamics, Inc., lectured on upper-limb prosthetics. Dr. Rory Cooper provided the final presentation, on assistive technology.

### Book Material Takes Shape

Throughout the symposium, the 100–120 attendees broke into discussion groups organized by specialty:

- Programs and Systems Practices
- Surgical Management and Planning
- Special Medical Considerations
- Physical Rehabilitation and Therapeutic Interventions
- Prosthetic Devices and Assistive Technologies

Prior to the conference, the invitees prepared book chapters in their areas of expertise, including but not limited to the speaker's presentation topics. The breakout groups discussed and edited each chapter, ensuring the written text met consensus opinion.

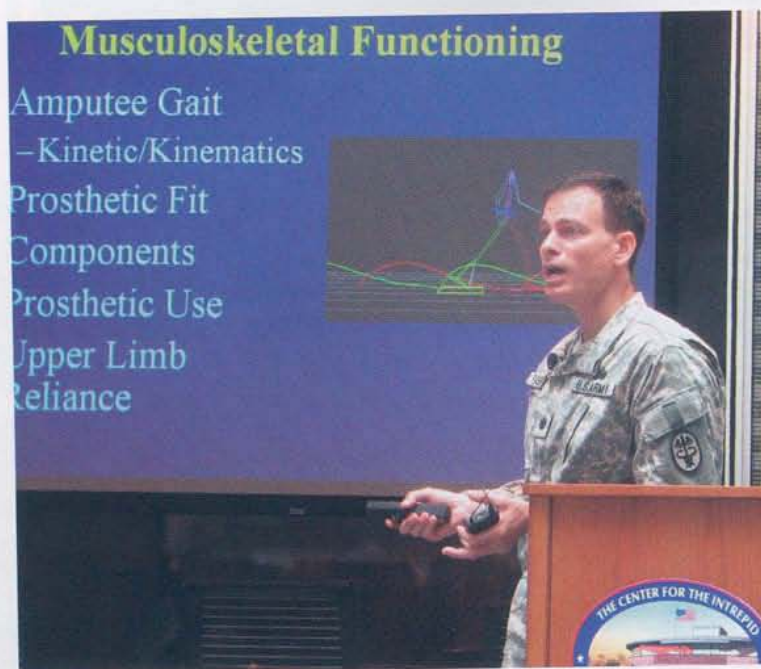
Col. Jeff Gambel, MD, from WRAMC Physical Medicine and Rehab Service, led the discussions of chapters in the Programs and Systems Practices breakout group. Many of these chapters will comprise the beginning/introductory section of *Reha-*



John Ferguson, chief prosthetist, Center for the Intrepid, speaks about lower-limb prosthetics.



LTC Paul Pasquina, MD, medical director of the amputee program at Walter Reed Army Medical Center, along with Dr. Rory Cooper, organized the three-day symposium.



*Rehabilitation of the Combat Amputee.* The group reviewed chapters on the history of combat amputee care, VA and DOD systems of care, support groups, benefits, vocational rehabilitation, and returning to military duty after limb loss. Also contributing to the group was PVA Director of Sports and Recreation Andy Krieger, who provided a chapter on sports and recreation opportunities.

Dr. Smith managed discussion of chapters in the Surgical Management and Planning group. These covered general surgical principles, special surgical considerations, and burn rehabilitation. The work addressed the unique surgical and burn care concerns specific to amputees.

Dr. Scott and Maj. Brandon Goff, MD, director, Inpatient Rehabilitation at WRAMC's PM&R Service, led the breakout group discussions of the chapters in the Special Medical Considerations group. This section of the textbook will address general medical principles of care, vision and hearing impairment, TBI, SCI, pain management, mental-health considerations, and blast effects.

Dr. Springer and Col. Raul Marin, MD, head of the WRAMC Gait Lab, directed discussions for the Physical Rehabilitation and Therapeutic Interventions breakout group. These chapters covered physical and occupational therapy, gait analysis and training, and epidemiology, evidence, and outcomes for amputees.

Ferguson and Joe Miller, WRAMC prosthetist, directed chapter discussions in the Prosthetic Devices and Assistive Technologies group. These chapters focused on prostheses, including specific ones covering prostheses for sports and recreation, and the future of prosthetics.

HERL graduate students attending were Jennifer Mercer, Michelle Sporer, Amol Karmarkar, Garrett Grindle, and Brad Impink. Each was assigned to a breakout group to transcribe the discussions and facilitate development of the textbook chapters. They will also write the final section of the textbook, which will summarize all the chapters and recommend future research. Borden

Institute staff also attended the breakout sessions, providing editorial direction during the chapters' discussion and editing.

## The Center Up Close

Col. Rebecca Hooper, PhD, program manager, Center for the Intrepid, provided tours of the impressive facility for the attendees during the first two days' lunch breaks. The four-story, 65,000-square-foot Center includes clinical space, a military performance lab with a gait lab, a pool, an indoor running track, a two-story climbing wall, and a prosthetics center.

Visitors were especially impressed by the facility's Computer Assisted Rehabilitation Environment (CAREN), a 21-foot dome with a 300° screen upon which a variety of "virtual realities" may be displayed. This simulator, the first of its kind, holds much promise for rehabilitating patients. The Center provides amputees and those with severe extremity injuries the best opportunity to regain their ability to live and work productively.

Drs. Cooper and Pasquina and the Borden Institute hope to publish the *Rehabilitation of the Combat Amputee* textbook by September 2008. The last textbook to address the care of injured servicemembers was 1999's *Rehabilitation of the Injured Combatant*, Vol. 1 and 2, also published by Borden. However, the previous textbooks did not provide information specific to the care of amputees.

With so many servicemen and -women returning from the War on Terror with severe limb trauma, publication of *Rehabilitation of the Combat Amputee* is crucial.

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