

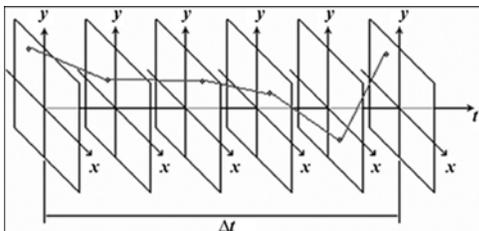
**Pain among veterans with spinal cord injury**

Philip M. Ullrich, PhD, et al.

This study was conducted to help us understand how veterans with spinal cord injury (SCI) and other persons with SCI may differ on pain. We compared veterans with SCI to nonveterans with SCI on pain intensity, pain interference with life, how well they complete normal daily activities, and thoughts about pain. We found that nonveterans with SCI were similar to veterans with SCI in most aspects of pain, but veterans had more troubling thoughts about their pain. The results of this study are useful in helping us understand what unique problems that veterans with SCI may face.

**Adaptive eye-gaze tracking using neural-network-based user profiles to assist people with motor disability**

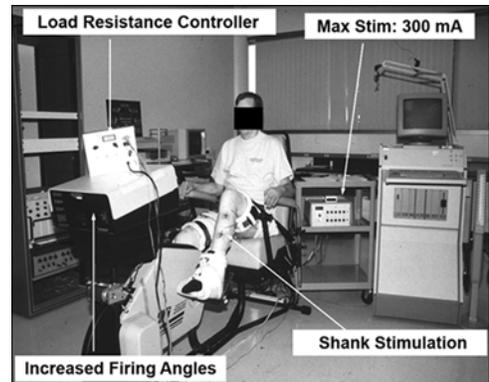
Anaelis Sesin, PhD, et al.



We designed an alternative human-computer interface that has enhanced practicality and allows real-time interaction for persons with severe motor disabilities. The interface uses eye gazing as the main computer input device, allowing individuals to interact with computers by using only their eye movements. Eye coordinates are obtained with a remote eye-tracking system and then sent to a module where they are normalized into mouse coordinates according to the current monitor resolution. This work is novel because it simplifies the eye-tracking technique to allow real-time and user-friendly interaction.

**Effects of modified electrical stimulation-induced leg cycle ergometer training for individuals with spinal cord injury**

Thomas W. J. Janssen, PhD; D. Drew Pringle, EdD



Electrical stimulation-induced leg cycling can be beneficial for individuals with spinal cord injury (SCI), but progression of exercise performance often stalls on the standard cycle ergometer. We evaluated whether exercise performance could be improved by modifying the ergometer through application of more electrical current and activation of the shank muscles. After a 6-week training period on the modified system, we saw marked improvements in cycling exercise performance, cardiorespiratory responses, and muscle strength in 12 men with SCI, even in those subjects whose performance had plateaued during training on the standard system. Hence, outcomes after cycling in people with SCI may be improved with this technique.

**Major medical conditions and VA healthcare costs near end of life for veterans with spinal cord injuries and disorders**

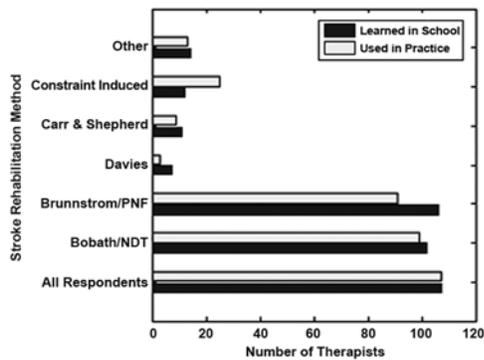
Wei Yu, PhD, et al.

This study examined healthcare costs and medical conditions near end of life for 2,008 veterans with spinal cord injuries and disorders. The average cost was \$24,900 in the second year before end of life and reached \$61,900 in the final year. The conditions that incurred the most costs included cancer (20.9%), influenza and/or pneumonia (15.1%), heart disease (13.5%), septicemia (5.9%), diabetes

(5.3%), and stroke (5.1%). Prevention is important in these areas. Early cancer screening and intervention; influenza and pneumonia vaccines; and blood pressure, cholesterol, and weight control in this population should be emphasized.

### Current clinical practices in stroke rehabilitation: Regional pilot survey

Pradeep Natarajan, PhD, et al.



The stroke rehabilitation methods adopted by therapists vary widely depending on their background knowledge, clinical experience, clinical skills, and personal preferences. This research was aimed at understanding the current physical and occupational therapy practices in stroke rehabilitation in the Midwest. The survey conducted among 107 clinicians in Kansas and Missouri shows that the majority agree on different treatment approaches in issues dealing with muscle tone, weakness, and limited range of motion in stroke rehabilitation. The data from this survey emphasize the need for continuing education of clinicians in effective treatment methods. The uncertainty among clinicians revealed in some sections of the survey shows that more evidence of clinical approaches is needed to ensure efficacious treatments.

### Bone health in ambulatory individuals with multiple sclerosis: Impact of physical activity, glucocorticoid use, and body composition

Mina C. Mojtahedi, MS, et al.

We examined the relationships among physical activity, glucocorticoid medication, body composition, and bone health in women with multiple sclerosis (MS) who could walk. We evaluated bone mineral content (BMC), bone mineral density, body fat and muscle, physical activity (measured by a pedometer and an accelerometer), and

glucocorticoid medication use in 29 women with MS. The results showed that physical activity was related to hip BMC. Lean mass was associated with whole body BMC and hip BMC. Glucocorticoid medication use was not associated with bone health outcomes. These data support the importance of physical activity in rehabilitation for individuals with MS.

### Comparison of peak shoulder and elbow mechanical loads during weight-relief lifts and sitting pivot transfers among manual wheelchair users with spinal cord injury

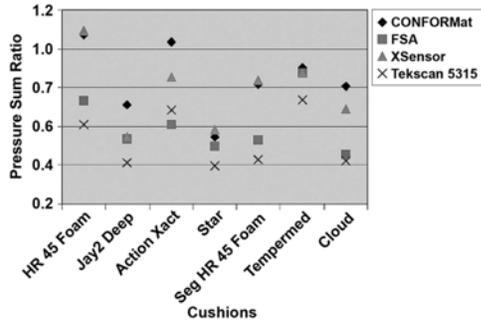
Dany Gagnon, PhD, PT, et al.



This study compared shoulder and elbow mechanical loads when the dominant upper limb (UL) played three distinct roles among a group of 13 individuals with paraplegia: leading UL when transferring from one seat to another of even height; trailing UL when transferring from one seat to another of even height; and lifting UL during weight-relief lifts when hands were placed in a similar position. The results confirmed that when transferring, individuals require more effort than when performing weight-relief lifts, particularly at the shoulder. The development of optimal shoulder strength is suggested before transfer training is initiated. Transfer aids may be useful to reduce UL mechanical load during transfers.

### Effect of model design, cushion construction, and interface pressure mats on interface pressure and immersion

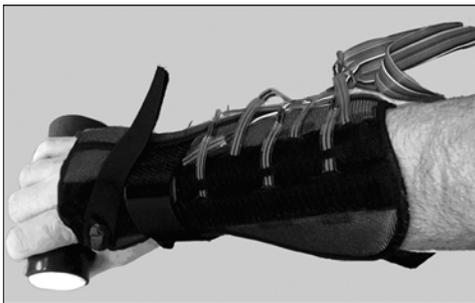
Leigh Pipkin, MSPO; Stephen Sprigle, PhD, PT



Pressure ulcers remain a serious medical complication for some wheelchair users. One goal of a wheelchair seating evaluation is the selection of a wheelchair cushion that protects skin by reducing and distributing pressure. Interface pressure (IP) mats are a tool used in seating evaluations. This study explored how the presence of an IP mat affects the IP on buttocks models. The results suggest that mat IP values may not be accurate, so clinicians should not rely solely on IP values when prescribing wheelchair cushions.

### Pressure signature of forearm as predictor of grip force

Michael Wininger, BS, et al.



Many U.S. military veterans have lost their upper limbs and rely on a prosthesis for hand function. Restoration of function is limited, however, since available prostheses offer insufficient control of applied force. While robotic technology has produced hands that move with

dexterity in many degrees of freedom, controlling them is currently beyond the reach of human amputees. Despite steady advances in basic prosthetic functioning through improved processing of multiple myoelectric signals, human control remains the biggest challenge to restoring dexterity. We present a new method of control that may endow upper-limb prostheses with more dexterity and proportional control of force.

### Compact and portable digitally controlled device for testing footwear materials: Technical note

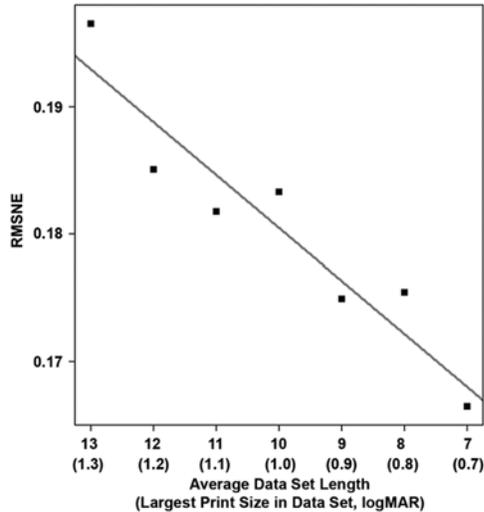
James G. Foto, BSME, CPed



To help prevent foot ulceration, foot-care providers often recommend placing custom insoles in the therapeutic footwear of diabetic patients who have no feeling in their feet. However, little scientific information is available to providers about the effectiveness and durability of the materials used to make the insoles. Previous studies examined various insole materials under rapid impact loading, simulating heel-strike during walking and running. The diabetic foot, where ulceration occurs most often, is better simulated at very low rates of loading. In this article, I describe the design and development of a computer-controlled device that simulates the forefoot phase of walking. This device quickly provides healthcare providers with useful information that will help them select appropriate insole materials for their patients.

### Models of reading performance in older adults with normal age-related vision

Rolf W. Nygaard, PhD, et al.



Reading rate response to changes in print size (data) was simulated using a sigmoidally shaped model of positive growth with which several reading rate characteristics could be calculated. When the length of the data set to be regressed was shortened, thereby increasing efficiency of data collection, our model of positive growth showed reduced per datum error. This finding suggests that, at least for some observers, reading performance is reduced at large print size. Shortening the data set length, however, alters the parameters of fit. A compound model of positive and negative growth showed improved fit in some observers, giving additional reading rate characteristics and a means of determining reduced reading performance at large print size. We considered the role that experimenter uncertainty might play in estimating characteristics like maximum reading rate and critical print size. The results highlight the objectivity and logic of regression when applied to the critical human activity of reading performance.

### Clinical and psychological correlates of two domains of hopelessness in schizophrenia

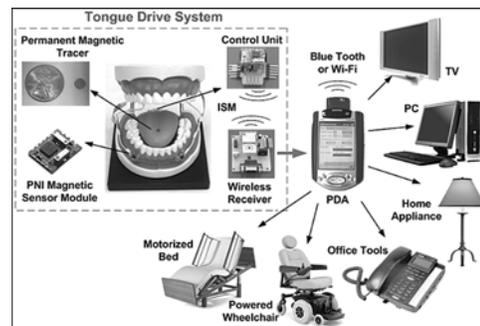
Paul H. Lysaker, PhD, et al.

Many veterans with schizophrenia struggle to have hope for their future. This study tried to understand what stands in the way of these veterans' belief that they can keep trying and achieve their goals. We assessed hope, stigma (negative beliefs about mental illness), symptoms,

and coping preferences in 143 veterans with schizophrenia-related illnesses. Results revealed that veterans with greater hope tended to have fewer symptoms of depression and loss of interest, were more active problem solvers, and rejected stigma or negative beliefs about mental illness. Our results may help professionals improve services for veterans with schizophrenia.

### Introduction and preliminary evaluation of the Tongue Drive System: Wireless tongue-operated assistive technology for people with little or no upper-limb function

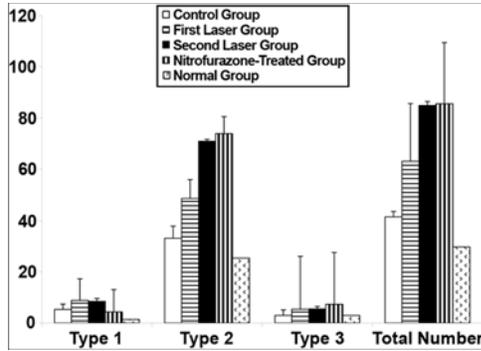
Xueliang Huo, MS, et al.



The Tongue Drive System (TDS) is a new assistive technology being developed for people with severe disabilities. It is designed to substitute some lost arm and hand functions with tongue movements. The TDS is wireless, unobtrusive, and noncontact. It consists of (1) a small permanent magnet the size of a grain of rice that is secured to the tongue by implantation, piercing, or tissue adhesives and (2) magnetic field sensors mounted on a headset outside the mouth or on an orthodontic brace inside the mouth. The sensor output signals are wirelessly transmitted to a computer that users carry on their clothing or wheelchair; they are then processed to pull out the user commands. Users could then apply these commands to access a desktop computer, navigate a power wheelchair, or control their environment.

### Effects of low-level laser therapy on mast cell number and degranulation in third-degree burns of rats

Mohammad Bayat, PhD, et al.



Thermal burns are common among soldiers and veterans. They produce more severe physiological stresses than

other forms of traumatic injuries. An estimated two million people suffer from burns in the United States each year. Mast cells may be important in wound healing because of their effect on collagen formation, vascular permeability, and angiogenesis. An increased number of mast cells is associated with a variety of pathological skin conditions in humans. Among these conditions are fibrotic disorders, including hypertrophic scars and keloids. The majority of scar reactions produce the appropriate volume of collagen to fill the dermal defect. Unfortunately, excessive scar formation is a common sequela of abnormal wound healing in burns and other traumatic and surgical injuries. These fibrotic lesions reportedly exhibit as much as 10 to 100 times more mast cells than normal human skin. However, the mechanism for either the proliferation or recruitment of mast cells in fibrotic lesions has not yet been elucidated.