

Spinal Cord Injury SIG



Winter 2013

Letter from the Chair

Welcome to our Winter 2013 Newsletter! We hope everyone had a safe, happy and healthy holiday season. Let us know if you set any good New Year's resolutions so that we all might aspire to be like you!



KJ Hutchinson

Many of you know that our annual Combined Sections Meeting had to be moved from the original Nashville, TN location to the current San Diego, CA one. The APTA has been so successful in attracting large numbers of clinician's to this meeting that the original location could not handle the anticipated crowd. I have been going to CSM almost every year since 1990 and I have to admit, having it this year just 3 weeks earlier than usual is taking some adjusting! Hopefully next year we can move it back to the typical second week in February date. Even still, the meeting is well worth the effort of getting there. For those who are lucky enough to be heading to CSM in a few wks (Jan 21-24th, 2013) congratulations! For the current newsletter we have pulled together information to serve as a guide to SCI programming at CSM. The posters, platforms and educational sessions are noted for your convenience. (Please see pages 6-8). The SCI programming is phenomenal this year! Keeping in good tradition, our SCI SIG is sponsoring outstanding presentations. One will focus on the application of FES for SCI rehabilitation by **Jennifer French MBA; Candy Tefertiller, PT, DPT, ATP, NCS; Therese Johnston, PT, PhD, MBA; & Lisa Lombardo, PT, MPT**. The second presentation will focus on the development of robotic devices to assist with

functional mobility and will be delivered by **Michael Goldfarb, PhD** and **Claire Hartigan, PT, MPT**. In addition to our SCI-SIG sponsored presentations, there are several other SCI specific presentations ranging from FES for health and fitness to neurophysiological basis for rehabilitation from SCI. Also, the highly anticipated SCI Edge taskforce will present their recommendations for outcome measurement after SCI. Finally, a new outcome measure to quantify recovery from SCI will be presented with rich video presentation and explanation. (Please see page 7 for full details). We will let you know in our Spring 2013 Newsletter how long the handouts for all these presentations will be available on the APTA website.

In our last newsletter, we chronicled the spectacular work of the International Spinal Cord Society and its e-learn initiative (www.elearnSCI.org). Just when I thought educational websites for SCI couldn't get any better, another site has arrived on the scene! Spinal Cord Essentials (www.spinalcordessentials.ca) is a joint effort between Toronto Rehabilitation Hospital and the University Health Network of Ontario, Canada. It is a free educational resource for individuals with SCI and their families and caregivers. One section contains over 70 handouts meant to address a wide range of aspects of SCI rehabilitation (self-management, ADL's, Bowel/Bladder care, mobility, emotional health, skin integrity and community living!) In addition, their SCI-U (SCI University) relays multimedia presentations focusing on healthy living after SCI. This is another website not to be missed! Within this newsletter we are focusing on manual wheelchair prescription. Our own Nominating Committee Chairwoman, **Twala Maresh, PT, DPT, NCS, ATP** and **Cary Yarbrough, ATP**, will guide us through all the considerations for ordering a manual wheelchair.

If you are new to the process or even have been

Winter 2013, Page 1

SCI SIG

Officers:

- Karen J. Hutchinson, Chair
- SueAnn Sisto, Vice Chair
- Marcie Kern; Secretary
- Twala Maresh, Chair Nominating Committee
- Lauren McCullough, Nominating Com.
- Erin Culverhouse, Nominating Com.
- Joy Bruce, WebSite Guru

Inside this issue:

Letter from the Chair	1-2
Opportunities to Serve/open SCI SIG positions	2
Continuing Education Offerings	2,3 & 8
Clinician's Corner, Kristen McNeal	3
Custom Manual Mobility Evaluations, TMaresh and CYarbrough	4-5
CSM SCI Programming	6-8

Letter from Chair (cont'd)

'at it' for a while, you will definitely learn a thing or two! Dr. Maresh outlines a nice 12 step process to make sure nothing important is missed.

And finally, we are very fortunate to have **Kristin McNealus, PT, MS, DPT, ATP**, who is highlighted in the "Clinician's Corner" section (page 3) of our newsletter. Dr. McNealus works in private practice and has a long and strong commitment toward exercise prescription for persons with SCI. She will outline a good upper extremity exercise program to help protect the shoulders of our patients who use wheeled mobility. Thank you Kristen!

To Everyone in Our SCI SIG,
Best Wishes for Healthy and Happy 2013!
Until next time.....

Karen J. Hutchinson, SCI SIG Chair

Continuing Education Courses Offered Spring 2013

Neurologic Practice Essentials: Clinical Decision Making as a Foundation for Expert Practice

Feb 23-24, 2013

Indianapolis, IN

Neurologic Practice Essentials: Exploring Neuroplasticity and its Rehabilitation Implications

April 27-28, 2013

Redwood, CA

For more information on these courses visit the Neurology Section website at <http://www.neuropt.org/go/events-and-courses/fall-regional-courses>

Additional courses on pages 3 & 8

Opportunities to Serve on the Spinal Cord Injury SIG!

The Spinal Cord Injury SIG is now accepting nominations for the following positions; Vice Chair and Nominating Committee. The positions will be voted upon in the 2013 elections. You may nominate a colleague or you may self-nominate. Follow the link <http://www.neuropt.org/go/nominating> to find the nominating form. A new form must be filled out for each nomination. The specific duties of each of these offices are:

SCI SIG Vice-Chair

- Serves as liaison with the Program Chair of the Neurology Section to coordinate SIG programming.
- Serves as Chair in the Chair's absence.
- Informally surveys interest areas for SCI therapists and scans for potential speakers when attending SCI professional meetings
- Attends the CSM business meeting and other forums asking for programming ideas and needs
- Keeps the ongoing list of programming ideas and needs
- Serves as the point person for the solicitation of speakers once program ideas are selected

- Is responsible for confirming speakers and communicating same with the programming committee
- Finalizes the program information for publication
- Writes a 'come join us' with advertisement of the programming planned for CSM for the fall newsletter.
- Writes a wrap up article re: CSM for the spring newsletter
- Works jointly with the other officers on direction for the SIG and fills task needs as required by the Chair.
- Provides for orientation of a successor

SCI SIG Nominating Committee

- Nominating committee officers primary responsibility is establishing a slate of candidates for open positions in the SIG leadership (responsibilities are lined out in the Neurology section PNP manual)
- Each officer is a liaison to a contingent of SCI national interests groups providing the officers with updates on activities and focus of these groups – writing brief synopsis for newsletter when appropriate
- One officer is responsible for checking web page content quarterly for function and suggesting updates
- One officer is responsible for greeting new SIG members quarterly.

- Works jointly with the other officers on direction for the SIG and fills task needs as required by the Chair
- Rotates through being the coordinator of the newsletter: Each officer is responsible for soliciting submissions or creating the primary content including clinician's corner, research translation, equipment updates, etc for one quarterly newsletter.

Becoming involved with our SIG is a wonderful way to keep current with what is happening around the country in the area of spinal cord management as well as conversing with therapists providing spinal cord injury treatment and research.

If you have questions about any of the positions please contact a member of the SCI SIG nominating committee and we would be happy to answer your questions.

Twala Maresh, Chair twalam@uca.edu,
Lauren R. McCollough,
mccol366@regis.edu or
Erin Culverhouse emculverhouse@gmail.com.

Clinician's Corner by Kristin McNealus

**Kristin McNealus,
PT, MS, DPT, ATP**



Wheelchair set up is part of the puzzle when it comes to addressing shoulder pain in people with spinal cord injuries. As clinicians, we have the ability and responsibility to fully educate our clients in what they can do to keep their shoulders healthy, as shoulder pain has been shown to impact overall quality of life as well as social participation of people with SCI.

The shoulder complex was not made for locomotion; think about the anatomical stability and strength compared to that of the hip. People who rely on their arms to move their bodies are putting a great deal of strain on joints that are not naturally built for it. With wheelchair propulsion, transfers, pressure relief, and even walking with a device, there is a great deal of pushing throughout the day. The anterior musculature gets stronger and shortens, which pulls the scapula into an anteriorly tilted, often protracted position. Thus decreasing the space in the glenohumeral joint, and increasing the risk of subacromial impingement leading to pain and rotator cuff tears. Without a proper seating system, people run the same risk when sitting with a C-curve and reaching frequently.



www.scitotalfitness.com

An exercise program that promotes stretching of the anterior musculature, specifically the pectoralis major and biceps, but including the anterior and posterior joint capsule will allow the scapula to move back to the neutral position. Strengthening the scapular stabilizers will help hold them there. It is also important to strengthen the rotator cuff in all persons with SCI. With the STOMPS study, a home exercise program was developed that trained shoulder extension /adduction and external rotation for strength, and shoulder elevation and scapular retraction for endurance. Based on the differences in motor recruitment during propulsion, you want to emphasize the external rotation of the supra- and infraspinatus for people with paraplegia; and for your clients with tetraplegia, you want to add more strengthening of the pectoralis major and subscapularis as internal rotation compensates for their decreased grip. It is recommended that the routine be performed 3 times per week.

Examples of these exercises can be viewed at.....<http://www.youtube.com/watch?v=u0t5MNHahLI> or view a wheelchair propulsion demonstration at: <http://www.youtube.com/watch?v=6fPuFevlRT0>.

1. Kemp BJ et al. Effects of reduction in shoulder pain on quality of life and community activities among people living long term with SCI paraplegia: a randomized control trial. *J Spinal Cord Med.* 2011 May; 34(3):278-284
2. Mulroy SJ et al. Strengthening and Optimal Movements for Painful Shoulders (STOMPS) in chronic spinal cord injury: a randomized trial. *Phys Ther.* 2011 March; 91(3):305-324 .
3. Mulroy SJ et al. Effects of spinal cord injury level on the activity of the shoulder muscles during wheelchair propulsion. *Arch Phys Med Rehabil.* 2004; 85:925-934

Continuing Education Courses Spring 2013



International Seating Symposium

March 5-9, 2013
Nashville, TN

For more Information:

<http://www.iss.pitt.edu/ISS2011/index.html>



American Spinal Injury Association

May 6-8, 2013

Chicago, IL

For more Information:

<http://www.asia-spinalinjury.org/annmtg/2013info.php>

Custom Manual Mobility Evaluation— 12 Steps to Success

by T.Maresh & C.Yarbrough

Twala H. Maresh,
PT, DPT, NCS, ATP

Assistant DCE
Senior Clinical Instructor
University of Central
Arkansas

&

Cary Yarbrough, ATP
Advanced Mobility
Solutions



T. Maresh

[L/20051123/Therapist%20Evaluation%20for%20MAE%20ver%206.pdf](http://www.invacare.com/HQ/EDITORIAL/20051123/Therapist%20Evaluation%20for%20MAE%20ver%206.pdf)

Second: Assemble the evaluation team. An appropriate team greatly depends on two things; the client and the experience of the team members. Team members may include the physical therapist, occupational therapist, equipment specialist/complex rehab provider, physician, case manager, and most importantly the Patient! The therapist with experience in ordering a variety of custom wheelchairs and/ or a certification as an ATP (Assistive Technology Professional) and Complex Rehab Provider with an ATP certification are needed for most wheelchair evaluations. All of the listed members may be needed if this is the client's first wheelchair and fewer if it is the clients' second or third. One team member that is absolutely essential is the client!

Third: The team will determine if a rigid or folding manual wheelchair will be the most functional. The team should consider the client's wheelchair propulsion skills, transfer ability, transportation and home accessibility needs, family issues and of course client preference. The current functional level of the client may be a starting point however, the whole client must be considered as well as their prog-

nosis and goals.

Fourth: Equipment trials are an essential component of folding versus rigid manual recommendation, especially if this is the first wheelchair for the client. The client, whenever possible, should be able to try various manual wheelchairs. This can be arranged with the Complex Rehab Provider or with the wheelchair manufacture representatives. Time required in each trial will vary based on the specific needs of the client. The equipment trials will provide valuable information for both the client and the therapist. The client should be evaluated in the equipment for ease of transfers, loading and unloading into vehicles and mobility on various surfaces. See the table below for a basic comparison of rigid versus folding frame wheelchairs.



Fifth: Measure the client twice. Have a team member check your measurement, and check your measurement through equipment trials. Accurate measurement is essential to a good wheelchair fit. The old standard of ordering a seat width of one inch on each side is outdated and should rarely be used today. Wheelchair fit should be as intimate as a prosthesis is



C. Yarbrough

For the novice clinician, recommending a custom wheelchair for the client with a spinal cord injury may seem like a daunting task. Even for the experienced clinician, keeping current and knowledgeable with the seemingly infinite number of wheelchairs and wheelchair accessories can be overwhelming. However, with the appropriate client information and assembled team, the wheelchair recommendation process can be successful. So where do you begin? We will take you through a basic 12 step process that we use to evaluate clients for custom manual mobility.

First: Complete an evaluation of the client to determine their mobility needs. The following is a link to an example evaluation form that can be used to document your findings,
<http://www.invacare.com/HQ/EDITORIAL>

Frame	Weight	Vehicle transport	Adjustability	Efficiency of push
Rigid  Example Rigid frame Quickie Q7 Sunrise Medical	17.5 lbs approx. (Wt. varies based on size and accessories)	Loading into rear seat possible of most vehicles possible, does require hand function	Rear wheels quick release, back can be folded, rear axles can be adjusted	Assists in decreasing UE strain, due to lighter weight and reduced flex in the rigid frame.
Folding  Example Folding frame Quickie 2 Sunrise Medical	29 lbs approx. (Wt. varies based on size and accessories)	Can be folded and loaded into rear seat, rear wheels may or may not be removed for transport	Rear wheels can be quick release, frame folds, rear axles can be adjusted. Size can be changed.	Efficiency of push is decreased due to increased weight and flex of folding frame and may contribute to UE strain.

Custom Manual Mobility Evaluation Cont.

to the residual limb. Understand that the wheelchair should always provide the client enhanced function and should never limit function.

Sixth: Understand the principles of seating and positioning. Correct seating begins with the pelvis, then the lower extremities and finally the trunk. The client must have a seating surface that supports the pelvis to allow for balance, posture and function. The pressure-reducing cushion must provide appropriate pressure relief, compliment the client's lifestyle and assist in stabilizing the pelvis. Interface pressure mapping may be used as a tool to further assess the appropriateness of cushion recommendation. If possible, it is recommended that the client try different cushions to allow them to give input on the decision process.

Seventh: The position of the rear axle is crucial to appropriate wheelchair propulsion and has been shown to be important in reducing overuse in the upper extremities.¹ The client should be able to touch the rear axle with their middle finger with their arm relaxed and positioned straight down. If the axle is positioned in front of the patient's hips, then the front end of the wheelchair will be tippy and may be more appropriate for the client that is independent in wheelies. Wheelchair squeeze is the difference between the seat to floor height in the front to the seat to floor height in the back and may need to be modified if the client cannot touch the rear axle. The average amount of squeeze is typically 0.5 to 3 inches. Squeeze can assist in improving the patient's forward balance in the wheelchair however too much squeeze can make transfers difficult.

Eighth: The client's stroke position and camber angle must be considered in order to assist in decreasing their fatigue and upper extremity pain. The optimal stroke position on the rear wheel is with the client's hand positioned at the top of the push rim, the elbow is at a 100 to 120 degree angle.^{1,3} The rear wheel camber

may increase the client's lateral stability and may assist in providing optimal hand position on the push rim, however too much camber can make accessibility difficult. Average camber for everyday use is between 0 and 4 degrees.

Ninth: The angle of the front rigging may enhance the client's positioning in the wheelchair as well as decrease or increase the overall wheelchair turning radius. The client's feet should be well supported with appropriate weight distribution in the thighs. Generally, front rigging angles of 80 to 85 degrees will require careful attention to the seat depth to ensure that pressure is not increased at the popliteal fossa or lower leg. When using a tighter front frame angle, footplate to ground clearances must be considered as well. At least two inches of clearance is required to prevent the footplate from contacting the ground during propelling over uneven terrain such as ramps or curb cuts. Attention must be paid to seat depth, front rigging angle and appropriate seating surface for equal weight between thighs and buttocks.

Tenth: Appropriate back height is important for posture, comfort and function in the wheelchair. Measurement of the back height depends upon the activity level of the client including wheelchair propulsion skills, balance, and cushion height. For example: measurements for the active client will start at the inferior angle of the scapula and may go lower and measurement for the client that is less active may start at the axilla. The client may benefit from a solid back for increased postural support, however having to remove this back for transport may be limiting. An adjustable tension upholstery may provide support as the use of standard sling upholstery is problematic due to wear.

Eleventh: Is everyone on the same page? Does the client understand everything that has been recommended? This is the time for the team to make sure that all areas of the client's life have been addressed and that the equipment to be recommended will meet expectations. The client should be

comfortable with the recommendation and agree to return for the final fit and adjustment when the recommended wheelchair is received.

And finally: The last and maybe the most important step is to reassemble the team for the final fit and adjustment. The therapist and the ATP from the equipment provider should be present for this step to ensure that everything works as recommended, and if not that the appropriate corrections are made in a timely manner. This is the time to make client specific adjustments to the wheelchair to ensure that the equipment optimizes the function of the individual. This final step is essential to the client's satisfaction with the evaluation process. With a team approach, the Success of the custom evaluation will be evident in the client's manual mobility.

1. Boninger ML. Safe Transfer Technique. University of Washington Model Systems Knowledge Translation Center. 2009.
2. Freixes O, Fernández SA, et al. Wheelchair axle position effect on start-up propulsion performance of persons with tetraplegia. *Journal of Rehabilitation Research & Development* Volume 47, Number 7, 2010. Pages 661-668
3. Desroches G, Aissaoui R, et al. Effect of system tilt and seat-to-back angles on load sustained by shoulder during wheelchair propulsion. *Journal of Rehabilitation Research & Development*. Volume 43, Number 7, 2006. Pages 871-882.



TM with Client

Therapists and/or Complex Rehab Providers with ATP certification can be found at: <http://www.resna.org/certification-directory.dot>



Spinal Cord Injury Programming at CSM

Join us for some great Spinal Cord injury programming at CSM in San Diego! SueAnn Sisto has made it easier to find by pulling together the presentations and posters that may interest you.

Pre-Conference:

Neurology

Monday

Correlating Neuroanatomy with Patient Presentation and the Neurologic Exam

Time: 8:00 am - 5:00 pm (See Program for Room)

Speakers: Desiree Lanzino, PT, PhD

The vision for physical therapy practice, according to APTA's Vision 2020 statement, asserts the role of the physical therapist as an autonomous, first-line practitioner of choice who will evaluate and treat patients directly for care. With that in mind, this 1-day course is designed to strengthen the skills of all physical therapists' neurologic screening, examination, and differential diagnosis proficiency. After an overview of the central nervous system, the neurologic exam will be presented in a manner that demonstrates how each component assesses a different neurologic level. Attendees will view a video of a neurologic screening exam and practice the neurologic exam on each other. The speaker will present clinically relevant neuroanatomy in a step-wise fashion, from the dorsal cortex to the spinal cord through the use of neuroimaging. At each level, evidence-based case scenarios that incorporate a variety of pathologies will be used to improve clinical reasoning by identifying expected signs and symptoms.

Conference Content by Section

Geriatrics

Tuesday

Somatosensory Reweighting: Untapped Resources in Balance Rehab

Time: 11:00am– 1:00pm

Speaker: Mike Studier

Level: Multiple

This is an intermediate to advanced program that will enlighten attendees to frequently unrecognized opportunities in balance retraining for patients with impaired balance. The focus will be placed on rehabilitation of patients with sensory impairment: neuropathy, vestibulopathy, incomplete spinal cord injury, and in some cases stroke. This program will also cover recent technological advances that will allow us to better detect, classify, treat, and analyze rehabilitative gains in various forms of balance impairment. Direct clinical applications will include improved testing and rehabilitation individuals with nonspecific visual dependence.

Neurology

Tuesday

SCI-SIG Sponsored Functional Electrical Stimulation Programs for People with Spinal Cord Injury: Clinician and Consumer Perspectives in the Clinic and at Home

Time: 8:00am-10:00am

Speakers: Jennifer French MBA; Candy Tefertiller, PT, DPT, ATP, NCS; Therese Johnston, PT, PhD, MBA; Lisa Lombardo, PT, MPT.

Functional electrical stimulation (FES) utilization is increasing in both clinical and home settings. There are decades of evidence-based applications of FES for spinal cord injury. This course will focus on the practical application of FES from a programmatic perspective within the clinic, as well as the consumer perspective in the clinic and at home.

Course content will include information about implementing an FES program in the clinic and at home, discussion of the evidence, FES parameters, utilization of surface systems as well as currently available implantable systems. Video and photographs of practical and real-world examples will be incorporated as appropriate. A panel of consumers who use FES on a daily basis will be included to facilitate discussion regarding implementation and perceptions.

SCI-SIG Sponsored Robotic Assistive Devices to Improve Quality of Life for Persons with Amputation and Paraplegia

Time: 11:00am—1:00pm

Speakers: Michael Goldfarb, PhD; Clare Hartigan, PT, MPT.

Recent advances in robotics technology have brought some new possibilities with respect to the development of assistive devices for purposes of enhancing the mobility and functionality of individuals with physical disabilities. This session will focus on the development of 3 such assistive devices, which are intended to provide enhanced mobility and functionality for persons with lower-limb loss, upper-limb loss, and paraplegia, respectively. Specifically, the talk will describe the development of a powered transfemoral prosthesis for lower-extremity amputees, the development of a multigrasp hand for upper-extremity amputees, and the development of a lower-limb exoskeleton for legged mobility assistance in individuals with paraplegia.

Spinal Cord Injury: Neurophysiology to Therapeutic Interventions

Time: 3:00pm-5:00pm

Speakers: Monica A Perez, PhD; Christine K. Thomas, PhD; Richard K Shields, PT, PhD, FAPTA; Jonathan Wolpaw, MD.

Control of voluntary movements is disrupted after spinal cord injury (SCI). Many descending and ascending inputs to higher centers are interrupted contributing to deficits in motor function leading to a reorganization of the neuromusculoskeletal system.

Continued on page 7

However, recent evidence suggests that individuals with SCI may be able to combine different sources of inputs to control motor tasks that cannot be performed with voluntary drive alone. The first aim of this symposium is to discuss the physiological consequences of SCI and its effects in the control of voluntary movements. The speakers will explore the physiological basis for strategies to enhance control of functional tasks, as well as factors that contribute to corticospinal modulation after SCI. In recent decades, evidence has shown that plasticity in the central nervous system plays a key role in the recovery of motor function after SCI. The second aim of this symposium is to discuss current strategies aimed at enhancing neuroplasticity after SCI, including repetitive electrical stimulation and operant conditioning. The speakers will examine how the interaction of plasticity in the brain and spinal cord induced by these protocols might contribute to the long-term therapeutic effects of these strategies after SCI and how neuronal plasticity can be the result of environmental mechanical stimuli. Advances and limitations in all these areas of research will be highlighted.

Wednesday

Outcome Measures Recommendations From Neurology Section Spinal Cord Injury EDGE Task Force

Joint Program: Education

Time: 11:00am-1:00pm

Speakers: Jennifer H Kahn, PT, DPT; Christopher Newman, PT, DPT; Phyllis D. Palma, PT, DPT; Rachel Tappan, PT, MPT; Candy Tefertiller, PT, DPT, ATP, NCS; Eileen Tseng, PT, DPT; Wendy Romney, PT, DPT; Clara L. Weisbach, PT, DPT.

The Spinal Cord Injury (SCI) Evidence Database to Guide Effectiveness (EDGE) Task Force was appointed by APTA's Neurology Section to make recommendations on the use of outcome measures in SCI. This work evolved from the Neurology Section's Toolbox course and Educational Consensus Guidelines group, as well as the Section on Research EDGE Task Force. Goals were to evaluate existing measures and make recommendations for their use in the SCI population in the clinical, academic, and research settings. Additionally, as part of the process, EDGE collaborated with The Rehabilitation Meas-

ures Database (www.rehabmeasures.org) to review measures and disseminate information to clinicians, educators, and researchers. A consensus process was used to rate measures based on identification of important constructs relevant to SCI, synthesis of psychometric data, and clinical utility.

In this session, the presenters will provide an overview of the process of the SCI EDGE Task Force, highlighting measures that are recommended for SCI using a variety of case examples (such as acute and chronic SCI, and motor complete and incomplete SCI), and outlining how to implement these measures into clinical, academic, or research practice.

A New Outcome Measure for Spinal Cord Injury Based on Pre-injury Function, Not Compensation: Neuromuscular Recovery Scale

Time: 3:00pm-5:00pm

Speakers: Michele Basso, PT, EdD; Andrea Behrman PT, PhD; Craig Vellozo, PhD, OTR; Jeffery J. Buehner, PT, MS; Elizabeth C. Watson, PT, DPT, NCS; Sandra Wojciehowski, PT, DPT

Quantifying recovery after spinal cord injury (SCI) in the clinic is a challenge. The few instruments specifically designed for SCI typically measure compensation. After SCI, a wide range of recovery occurs so that any new instrument must be sensitive, reliable, and valid. The new Neuromuscular Recovery Scale (NRS) was developed and refined by clinicians and scientists in the Reeve Foundation NeuroRecovery Network (NRN), 7 outpatient clinical sites in the US. The NRS is innovative in that scores are based on normal, pre-injury performance criteria. This session will present the psychometric properties of the NRS, including interrater and test-retest reliability and validity using item-response theory. Descriptions of the items that comprise the NRS will be provided as will standardization procedures. Video case studies and hands-on demonstrations across complete and incomplete SCI by skilled clinicians will maximize learning and increase effective translation into clinical use. Interpretation of the scores and discussion of how they can be used to guide rehabilitation will be drawn from widespread use of the NRS in the NRN.

Thursday

Functional Electrical Stimulation: Health and Fitness Benefits for People with Spinal Cord Injury

Time: 8:00am-10:00am

Speakers: Therese Johnston, PT, PhD, MBA; Deborah Backus, PT, PhD; C. Scott Bickel, PT, PhD; Samuel C. Lee, PT, PhD; Kevin McCully, PhD.

This course will focus on the evidence for the use of functional electrical stimulation (FES) for health and fitness benefits for people with spinal cord injury (SCI). FES is becoming more widely used in the clinical environment and evidence is critical to guide our approach to allow for optimal benefits in cardiovascular, metabolic, and musculoskeletal health. This course will discuss what is currently known in the literature as well as questions that remain to be answered about the benefits of FES and characteristics of those consumers who may best benefit from specific FES interventions. The literature will be summarized and presented to allow clinicians to apply this new evidence-based knowledge into their clinical practice. Specific applications of FES to be covered will include cycling, walking, and resistance training. Case examples will be provided throughout the session. In addition, other issues that impact success with FES will be discussed, including muscle fatigue and potential ways to address it to increase success.

Platform Presentations by Section and Day:

Wednesday

Aquatics

The Effects of an Individualized Aquatic Physical Therapy on Gait and Balance in an Individual with Chronic Incomplete Spinal Cord Injury

Time: 9:00am-9:30am

Speaker: Lisa Falvo
Cardiovascular and Pulmonary

Efficacy of Inspiratory Muscle Training for Increasing Functional Capacity in Patients with Traumatic Spinal Cord Injury: An Evidence-Based Review

Time: 8:45am- 9:00am

Speaker: Betty Smoot

Continued on page 8

Poster Presentations by Section and Day:

Tuesday
Research

Spinal Cord Injury Pain is Associated with Abnormal Growth of Sensory Neurons

Presenters: Bareiss SK; Gwaitney M; Korieski A; Brewer KL

Determining the Efficacy of Zoledronic Acid on the Retention of Bone Mineral Density During First year of Spinal Cord Injury

Presenters: La Fountaine MF; Leninger K; Gilbert GG; Dupree MS; Cano K; Ciriigliaro CM; Bauman WA.

Comparing the Interventional Effects of Stand-Retraining Therapy and Body-Weight-Supported Treadmill Training on Bone Mineral Density in Individuals with Spinal Cord Injury.

Speakers: LaFountaine MF; Kennedy EM; Sedereas C; Maus A; Horowitz N; Ciriigliaro CM; Bauman WA; Forrest G.

Thursday
Neurology

Investigation of a Non-surgical Option to Correct Neuromuscular Scoliosis in an Adult Quadriplegia: A Case Review

Presenters: Baniewich C; Dickson J; Levine C; McLennan L; Hastings J.

Use of a Clinical Practice Guideline and Robotics for Locomotor Training of a Patient with Chronic Incomplete Spinal Cord Injury: A Case Report

Presenters: Crawford A; Banta M; Chan A; Crump Z; Devers AM; Olejer MS; Vaught J; Wilks M.

Cardiovascular Outcomes During Functional Electrical Stimulation Ergometry After Complete Cervical and Upper-Thoracic Spinal Cord Injury

Presenters: Day BE; Simpson DJ

Monitoring Neurological and Functional Recovery During Robot-Assisted Gait Training in Spinal Cord Injury

Presenters: Galen S; Clarke C; Allan D; Conway B.

Seating for Persons with Tetraplegia as a Life-Saving Measure: A Case Report

Presenters: Incantalupo VM; Collins CK

Multi-Center Survey fo Rehabilitation Protocols after Tendon Transfer to Restore Pinch in Tetraplegia

Presenters: Johanson M; Jaramillo J; Murray WM; Hentz VR

Supramaximal Torque Production During Repeated Dynamic Contractions in Individuals with Incomplete Spinal Cord Injury

Presenters: Kim HE; Thompson CK; Hornby G.

Gait Training for a C4 Incomplete Spinal Cord Injury Patient Using High-Intensity Training Program: A Case Study

Presenters: Kliver E; Combleet SL

Effects of Serotonergic Agents on Locomotor Performance in Individuals with Motor Incomplete Spinal Cord Injury

Presenters: Leech KA; Thompson CK; Kinnaid C; Hornby G.

The Influence of Aquatic Therapy in Combination with Activity-based Restorative Therapies (ABRT) on Gait Efficiency and Balance in an Adult with Chronic Spinal Cord Injury (SCI): A Case Report

Presenters: Mertins R; Martin R; Becker D; Sadowsky C; McDonald J.

Comparison of Forward Versus Backward Walking Using Body-Weight-Supported Treadmill Training in an Individual with Spinal Cord Injury: A Single-Subject Design.

Presenters: Moriello G; Pathare N; Cirone C; Pastore D; Shears D; Sulehri S.

Use of a Walking Recovery Clinical Practice Guideline Decision Making for the Rehabilitation of a Patient with an Incomplete Spinal Cord Injury: A Case Report

Presenters: Olejer MS; Banta M; Chan A; Crawford A; Crump Z; Devers AM; Vaught J; Wilks M

Soleus H-Reflex Modulation After Motor Incomplete Spinal Cord Injury: Effects of Locomotor Training

Presenters: Phadke CP; Nair P; Madhavan S; Bowden M; Thompson F; Behrman A

Somatosensory and Functional Changes Following Robotic Training of the Upper Limb in an Individual with Chronic Complete Tetraplegia: A Case Report

Presenters: Riley C; Backus D.

Impact of Somatosensory Augmentation and Repeated Movement Training on the Upper Limb: A Case Study

Presenters: Riley C; Backus D.

Does Early Orthotic Management Delay Motor Learning and Walking Recovery in an Individual with Incomplete Spinal Cord Injury?

Presenters: Szot L; Marting L

Pediatrics

Children with Severe Incomplete Spinal Cord Injury Exhibit Greater Lower-Extremity Muscle Activation During Locomotor Tasks Compared with Tests of Voluntary; Isolated Joint Movements

Presenters: Foz EJ; Tester NJ; Trimble S; Kautz SA; Howard DR; Behrman A

Walking Function and Musculoskeletal Development 5-7 years Post-locomotor Training in a Child with Incomplete Spinal Cord Injury

Presenters: Nair J; Trimble S; Tester NJ; Senesac CR; Spiess M; Rademaker M; Howland C; Lott D; Vandenborne K; Howland DR; Behrman A

Online SCI Courses Through the APTA

Here is a list of titles of available online courses related to Spinal Cord Injury.

- A Learning Module for Neurorehabilitation Curriculum: walking recovery, locomotor training and incomplete SCI
- Cervical Spinal Cord Injury: improving arm and hand function
- Spinal Cord Injury: experimental procedures and neuroprosthetics
- Spinal Cord Injury Overview and Assessment of Function
- Structuring Clinical Interventions to Maximize Motor Recovery after Stroke and Spinal Cord Injury: the importance of amount, intensity, and type of practice

For more information about the courses and how to sign up, go to:

<http://learningcenter.apta.org/Courses.aspx>