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President's Message

Hello...Winter has turned to Spring with all the beautiful budding flowers.

The best news to share is our membership growth, we are now 963 members strong. This continues to be fabulous news for all of us. The section has been recognized in the APTA Component News for the past few months as having the highest member growth averaging 13.9%.

Our strategic plan from August is presently in the hands of APTA for approval. We are proceeding with the primary objectives and will publish the complete document for your review as soon as it is available.

Kathy Galloway and Karen Gibbs have worked tirelessly to revise the section bylaws. They are in the process of APTA review and revision. The new bylaws will require membership vote in the near future. You will have the opportunity to review them for 30 days prior to the vote. I am asking all of you to take the time to review this document, as it is our governing rules.

CSM 2008 in Nashville was another great success for the section. Karen Albaugh, our program chair, did a great job of coordinating the program. In her absence Harriett Loehne and Jeff Slear coordinated her graduate students for room and presentation monitoring. It was a fabulous effort on everyone's behalf. Thank you all.

I asked everyone to stay tuned for our new marketing strategy. Note the new logo on the newsletter. Your membership committee is working hard to create a new booth, ribbons, surprise giveaways and much more. With nearly 1,000 members, our colleagues will start to notice the Section on Clinical Electrophysiology and Wound Management. Congrats to all of you !!

Perhaps the most significant changes occurring are those in the APTA headquarters restructuring. It is very exciting and positive for our professions growth. Please stay tuned to all APTA correspondence as they inform us of the changes.

As always, we continue to monitor reimbursement issues related to wound care, electrotherapy and EMG. I encourage all therapist to the reimbursement article which summarizes the changes in the Medicare contractors organization.

Please remember PT 2008, **Kick it up in San Antonio**, June 11-14th, 2008.

As the season changes and spring rolls into summer, as a ask a colleague if they are a member of the APTA. If not recommend they join. If everyone of us in the section brought in 1 member we would be 2,000 strong. I have personally signed on two new members this winter, I challenge all to find a new member.

Your President,
Pam Unger

Newsletter of the
CEWMS of the
American Physical
Therapy Association

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Guide for Integumentary/Wound Management Content in Professional Physical Therapist Education Completed and Approved by the APTA

By Karen A. Gibbs, PT, DPT, CWS
Assistant Professor
Texas State University, San Marcos, TX

The WMSIG Wound Recommendations Task Force is proud to announce the completion and APTA approval of the *Guide for Integumentary/Wound Management Content in Professional Physical Therapist Education*. The 18 page monograph, approved by APTA in November 2007, is designed to assist academic and clinical faculty prepare physical therapy students for entry-level integumentary practice. It is our hope that this information will also help promote more consistent integumentary content delivery across academic institutions.

Written in the Normative Model format, the monograph provides 36 *specific* content recommendations with examples of behavioral and instructional objectives for both the classroom and clinical setting. Faculty may use this tool in a variety of creative ways ranging from a general checklist against current course syllabi to a guide for developing a complete integumentary/wound management program.

The *Guide for Integumentary/Wound Management Content in Professional Physical Therapist Education* can also be used as an educational tool outside of

the formal physical therapy entry-level curriculum. Sharing this monograph with other healthcare professionals and the general public is an excellent way of clearly demonstrating how physical therapists can be involved in multidisciplinary wound management. The monograph could also be modified to assist with integumentary education in other fields such as nursing and medicine.

The skeleton of the current monograph was developed several years ago and placed in draft form on the Section's website. The current Task Force redesigned the old draft to match the Normative Model, updated old information, and added an incredible amount of current, detailed content necessary for entry-level doctoral physical therapy practice.

Thank you Task Force members for all your hard work: Karen Gibbs, Harriett Loehne, Karen Wientjes-Albaugh, and Luther Kloth with early efforts of Kathie Lampe, Jill Heitzman, Corky Atkins, Holly Hunter, Linda Hart, and Anne Meyer. The complete monograph is available at no charge on the SCEWM website at www.aptasce-wm.org.

On a personal note, I want to thank Harriett, Karen, and Luther for the opportunity to work on this project – it was a great experience!

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WMSIG Update

By Harriett B. Loehne, PT, DPT, CWS, FCCWS
President

The most exciting news from the WMSIG is the announcement of the final document with APTA approval: *Guide for Integumentary/Wound Management Content in Professional Physical Therapist Education!* It is now on the Section website - the result of many years of work by many therapists: a gift to the public to assist with a standard of Integumentary Practice education for entry level physical therapists. For details please see the wonderful article in this newsletter by Karen Gibbs, who was such a driving force behind the final document.

Our annual meeting at CSM 2008 in Nashville was well attended by approximately 30 clinicians. It was good to visit with colleagues and catch up on news around the country. Our members are very active in our profession, as many were recognized for new CWS[®] certification, DPT degrees, presentations and/or posters at CSM and other conferences, published articles and book chapters, editors of text books, research, and other awards. One special honoree is the President of our Section, and a WMSIG member and past President, Pam Unger, who has been chosen to give the Maley Lecture at Annual Conference 2008.

Elections took place at the meeting, with our officers and committee members as follows:

- **President:** Harriett B. Loehne – re-elected
- **Vice-President:** Karen Gibbs – appointed by the Executive Council per the Bylaws to fill an open position
- **Secretary/Treasurer:** Jaimee Haan – elected
- **Nominating Committee** (*elected positions*)
Chair: Rose Hamm
Stephanie Woelfel – appointed to fill an open position
Sharon Lucich – elected
- **Education Committee**
Chair: Karen Gibbs (per Bylaws, the VP)
Teri Biven, Jenna Driscoll, Melissa Johnson
- **Practice Committee**
Chair: Lu Kloth
Diane Merwarth, Jaimee Haan
- **Research Task Force** – appointed to develop a job description, roles, goals, and responsibilities of a Research Committee
Glenn Irion Mary Kroohs
Melissa Johnson Jaimee Haan Mary Jo Geyer

If you would like to serve on any of the above committees or like job descriptions, please let me know, and I will put you in touch with the Chair. The Chair of the Research Task Force will be named

soon, or may be by the time this goes to press.

APTA has informed us that we are too small a SIG to have an officer also be the Chair of a Committee – in fact, they advise that one person should hold only one office or be Chair of only one Committee (can serve on as many committees as you wish). This will require Bylaws changes, which you will hear about from the Section in the future.

Reimbursement issues were discussed at the meeting, with multiple states with concerns. Acute Care hospitals will be affected by the CMS final ruling due on April 1, 2008, as to which preventable events will no longer be reimbursed after October 1, 2008. Nosocomial Stage III and IV and elbow and unspecified pressure ulcers are expected to be included, as well as post op mediastinitis and falls – all of which could affect physical therapy wound management. The expectation is that the admitting physician will have to Stage and document the pressure ulcers within two business days of admission in order for them to qualify for increased reimbursement.

In January 2008, David Scalzitti of APTA Research met at APTA Headquarters with Scott Ward, Glenn Irion, Jaimee Haan, Val Sullivan, and me for a marathon weekend to begin work on Integumentary Scenarios for Hooked on Evidence. We made remarkable progress, completing 15 scenarios. We are now in the process of referencing each, as well as reviewing scenarios that include wounds on other Practice Pattern Hooked on Evidence sites. It was an educational and invigorating time, despite the snow and ice in Atlanta (!) that made interesting travel itineraries there and back for some of us...

Happy Spring to everyone!

Harriett

Pam Unger, Section President Honored as the John H P Maley Lecturer for 2008

The Maley Lectureship was established to honor John H P Maley, former president of the Chattanooga Corporation and to recognize the close relationship of the Chattanooga Corporation with APTA over the years. Each year, the lecture's content is designed to address innovation in clinical practice. The purpose of the award is to acknowledge and honor a physical therapist member of the American Physical Therapy Association who has made a significant contribution to the profession in the area of clinical practice.

I encourage all of you to offer your congratulations to your section president, Pam Unger, who has been named the 2008 John H P Maley Lecturer for PT 2008 to be held in San Antonio, Texas.

Description of Board-Certified Clinical Electrophysiologic Physical Therapy Specialists: 2004-2005 Survey Results

By Elaine Armantrout, PT, DSc, ECS
Clinical Electrophysiologic Specialty Council Chair

In 2004-2005, the Specialty Council on Clinical Electrophysiologic Physical Therapy performed its third practice analysis survey. The purpose of this practice analysis survey was to ensure that the competencies required for board certification for clinical electrophysiologic clinical specialists (ECS) adequately reflect changes in knowledge and practice over time. The results of this survey were published in the book *Clinical Electrophysiologic Physical Therapy Description of Specialty Practice* in 2006.

The following is a summary of the qualities, attributes, and demographics of the 68 board-certified ECS specialists who responded to the survey. This reflects the most current descriptive information on physical therapy clinical electrophysiologic specialists.

Age (by group)

35-44 years	25%
45-54 years	42%
55-64 years	25%

Gender

Male	95%
Female	5%

Ethnicity

White (non Hispanic).....	94%
Non-white	6%

Years of Experience

Forty-six per cent (46%) of the respondents have greater than 21 years of practice as a clinical electrophysiologic specialist and 66% have more than 21 years of practice history as a physical therapist. Only 3% of the respondents have five or less years practicing as a specialist and 2% have five or less years practicing as a physical therapist.

Professional Physical Therapy Education

Bachelor's degree.....	50%
Certificate in PT	13%
Master's degree.....	32%
Doctorate in PT	4%

Highest Academic Degree

Bachelors degree	34%
Master's degree.....	38%
Doctorate in PT	14%
PhD, EdD or ScD	14%

Training Methods

The methods of developing and maintaining their current clinical skills in electroneuromyographic (ENMG) testing includes the mentoring process (32%), continuing education courses (30%), and self-study (20%). Other methods of developing ENMG skills included enrollment in graduate programs and formal clinical residency programs, and participation in in-service education programs.

Electrophysiologic Professional Activities

Patient management	57%
Non-electrophysiologic patient management	20%
Administration	9%
Teaching.....	8%
Research	3%
Consultation.....	3%

Practice Settings

Urban	42%
Suburban	40%
Rural	18%

The majority of clinical electrophysiologic specialists work in a private physical therapy office (59%). Most clinical electrophysiologic specialists are full-time self-employed (47%) followed by full-time salaried (43%).

Referral Sources for ENMG Testing

Physicians (specialists)	57%
Physicians (primary care)	34%
Physician assistants	5%
Nurse practitioners	4%

Most Common Referral Diagnoses

Peripheral nerve entrapment neuropathy ...	50%
Radiculopathy	26%
Polyneuropathy.....	16%
Motor neuron disease	2%
Myopathy	2%
Other.....	4%

The mean number of electrophysiologic procedures performed in one year by the respondents of this survey is 500 studies.

ENMG Reimbursement Rate

The median reimbursement rate for a unilateral extremity ENMG study is \$300 and it is \$471 for a bilateral extremity or polyneuropathy ENMG study.

Miscellaneous

The respondents to this survey are familiar with the American Association of Neuromuscular and Electrodiagnostic Medicine's published practice parameters (87%) and are less familiar with the International Federation of Associations of Anatomist's International Anatomical Terminology (35%). The median age of ENMG equipment used by the respondents is between 2-5 years.

Comparison to the 1994 Specialist Survey

The total number of board certified specialists in clinical electrophysiologic physical therapy in 2004 is 106 compared to 51 specialists in 1994. A greater number of clinical electrophysiologic specialists now work in a private practice office setting (59%) than in 1994 (35%). In addition, only 45% of clinical electrophysiologic specialists now work full-time as compared to 87% in the 1994 survey.

The next competency revalidation survey will occur in 2015. The *Description of Specialty Practice* is available for purchase through the American Physical Therapy Association.

EMG Roundup

By Justin Elliott and Jeff Slear

Associate Director, State Government Affairs, APTA

The issue of EMG continues to be a hot topic in the state legislatures, although 2008 appears, so far, to be a little quieter than previous years.

In 2007 Texas was the latest state to encounter EMG legislation which was thankfully defeated. Since the Texas legislature meets only in odd numbered years, our Texas chapter will not face this legislation again until 2009. The legislation stemmed from an ongoing lawsuit between the Texas chiropractors and neurologists. However, currently no decision has been reached and the lawsuit continues.

In New York, Assembly bill 382 and Senate bill 676 were carried over from the previous session. Similar to other bills of this nature, it would restrict physical therapists from performing studies. Each bill is presently sitting in its respective Senate and House committees. There has not been any movement or activity on the bill since their introduction almost one year ago. Given the uphill challenge in passing a bill through the New York legislature, this bodes well for the hopeful demise of these bills later in 2008.

Readers will recall that Wisconsin has had ongoing activity over the last couple of years with legislation. In June 2007, Wisconsin Assembly bill 325 had a hearing but was not voted out of committee due to the efforts of both the APTA and the Wisconsin Physical Therapy chapter. In late November 2007 shortly after the Thanksgiving holiday, its Senate

companion (SB 175) was posted for a hearing in the Senate Health Committee with only five days notice. The neurology group brought in a neurologist from Walter Reed Medical Center who claimed that physical therapists do not do EMG studies in the Army. This was rebutted with testimony from the Wisconsin chapter. The bill was then held in committee and further action is anticipated at this time.

Apparently in view of their legislative defeats, the neurology and physiatrist groups are changing their focus. There is evidence that they are now targeting the various insurance groups in an attempt to convince them that they should be the only ones reimbursed for EMG studies. Recognizing that this issue is now in play in both the legislative and reimbursement arena, APTA has put EMG on the agenda for the 2008 State Policy & Payment Forum. This annual meeting (sometimes referred to as the State Gov't Affairs Forum) brings together all the various state legislative chairs, chapter presidents, executive directors, and chapter lobbyists. The 2008 Forum will also include the various reimbursement chairs and payer specialists from the various APTA state chapters.

As we have seen, each year brings new challenges for the practice of EMG by physical therapists. By working together, we can assure that future physical therapists will have the opportunity to perform EMG/NCV studies.

Thank you For Making CSM 2008 Another Success!

by Karen Albaugh
Program Chair

CSM 2008 was a tremendous success- with registrations exceeding 7,000 this year! It was the first year I have missed attending CSM (due to the arrival of my little girl!) since I began my role as Program Chair. I want to thank all who ensured that the programming went off without a hitch. Thank you to the speakers we had this year. Feedback was very positive for all of the sessions. Thank you to Harriett Loehne, Jeff Slear, John Halle, Jaimee Haan and Sharon Lucich for assisting with the sessions. And a special thank you to the Neumann College DPT students, James Bond, Lisa Hayden and Shirley Carrion for all your help with the Section activities during CSM 2008. Looking forward to planning a great program for 2009. See you in Vegas!

Members Who Volunteered and Staffed the Sections Booth During CSM 2008. Thank You!

Corky Atkins
Rick Nielsen
Sara Maher
Karen Gibbs
Jerome Danoff
Rose Hamm
Meryl Gersh
AJ Robinson

Ed Mahoney
James Banogen
Karen Coker
Mike Skurja
John Lugo
Lisa VanHoose
Sharon Lucich
Bob Rittman

REIMBURSEMENT NEWS

Wound Care

Office of Inspector General (OIG) Report

Negative Pressure Wound Therapy is another therapeutic modality that has come under scrutiny of the OIG. This report specifically speaks to extent to which claims for negative pressure wound therapy pumps met Medicare coverage criteria and supplier documentation requirements in 2004.

- 25% of all pumps claims did not met Medicare coverage criteria
- Virtually all pumps claims met supplier documentation requirements
- For 44% of the claims, the information on the supplier –prepared statement, was not fully supported in the medical record.

There was specific emphasis placed on the lack of documentation in the medical record sighting; type of wound, wound measurements, treatments prior to negative pressure wound therapy pump.

The OIG report recommended that: CMS ensure claims for the pump meet Medicare coverage criteria and are paid appropriately, CMS should consider establishing advance coverage determination of pump claims from suppliers that have a high number of claims that have been denied or have a pattern of over utilization, CMS should consider a face-to-face examination of the patient by the physician, and CMS should consider strengthening the coverage criteria for the pump and increasing prepayment reviews of these claims.

Levinson, D, “Medicare Payments for Negative Pressure Therapy Wound Pumps in 2004”, HHS, OEI 02-05-00370, June 2007.

Welcome New Members

10/1/07 to 5/8/08

Marcin Madej
Osiris Del Rosal
Trent Roederer
Fides Santos
Veronica Castro
Molly Panos
Garry Dillon
Karen Pinero
Krupa Patel
Kathryn Foy
Teresa Barney
Sherry Sagers
Ketra Eichelkraut
Jessica Dykes
Rebecca Gillin
Erica Nesvig-Paddock

Lindsey Branstetter
Gloria Ammons
Brittany Harkins
Emily Patrick
William Ombao
Lyndsay Shaffer
Verisha Sices
Brook Medina
Lisa Tramp
Lisa Goldman
Tiffany Jernigan
Andrea Schroeter
Chanelle McCreery
Shawn Toungate
Reid Augustino
Dee Green

Rehab Services

Medicare Contractors

The Centers for Medicare and Medicaid Services (CMS) in Baltimore, MD is what most clinicians believe makes all the decisions for coverage policies across the country. In actuality, CMS in Baltimore writes only the national coverage decisions (NCDs). The majority of policies are written by the local contractors and referred to as local coverage determinations (LCDs). Therefore, it is crucial to know who your Medicare contractor is.

Since the beginning of the Medicare program, CMS has contracted with insurance companies to process the claims from providers of care to the Medicare beneficiaries.

Carriers are the processors of Part B claims (physicians and private offices). The *Fiscal Intermediary* processes Part A claims (hospitals, home health agencies, hospice, skilled nursing facilities, etc). There are times when the insurance company is awarded both contracts and the LCDs are the same. In other instances different insurance companies have the contracts. In those cases, the LCDs for the hospital outpatient and physician may be different.

The Medicare Prescription Drug, Improvement, and Modernization Act of 2003, requires the Secretary of Health and Human Services to create new Medicare Administrative Contractors (MACs). The MACs will service both Part A and B. This process will be completed by 2011, there will only be 15 MACs, unlike the 37 Fiscal Intermediaries.

This consolidation should improve the services for both the Medicare beneficiaries and the providers of care.

As a result of this consolidation, all LCDs will require revision. As the LCDs are rewritten and evaluated the draft will be posted on the MAC website. There is generally a 60 day comment period before the LCD becomes final. It is imperative that we all read and comment on these policies. These LCDs include outpatient rehab or physical therapy services, wound care services, debridement, etc. APTA is monitoring this activity and asking for your comments, please respond accordingly.



The following are Abstracts of the Section's research presented during CSM-2008 in Nashville.

7 Abstracts

TITLE: Normative values for tibial nerve studies: motor recording from the flexor hallucis brevis

AUTHORS (*last name, first name*): Galloway, Kathleen M.¹; Lester, Mark²; Evans, Rachel²

INSTITUTIONS (*all*): 1. Oakland University, Rochester, MI, USA.
2. United States Army Research Institute of Environmental Medicine, Natick, MA, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis: The purpose of this study is to describe tibial motor recording from the flexor hallucis brevis (FHB) and to add normative values to the literature. Orthodromic medial and lateral plantar sensory normative values will also be presented, as will intrarater reliability for all measures.

Number of Subjects: Eighty healthy female subjects between the ages of 18 and 35 (mean age 23.6 +/-2.7) years were studied. Forty of the original subjects (mean age 23.4 +/- 2.6) were available for serial testing.

Materials/Methods: Data was collected using a Cadwell Sierra LT EMG machine. Motor recording from the medial plantar branch of the tibial nerve was achieved using a bar electrode with the cathode placed over the distal lateral head of the FHB. Stimulation sites included the ankle and the popliteal fossa. Orthodromic mixed sensory medial and lateral plantar studies were achieved with recording posterior to the medial malleolus and stimulation 14-16 cm distal on the plantar aspect of the foot. Means and standard deviations were recorded for measures of latency, velocity and amplitude. Average values intraclass correlation coefficients (ICC) were calculated for all measures in the subset of 40 subjects who returned for serial studies a total of 4 times in a six month period.

Results: The mean tibial motor latency was 4.1 ±0.93 msec (ICC=0.823). The mean tibial amplitude and nerve conduction value was 8.0±3.1 mV (ICC= 0.876) and 45.5±3.4 m/s (0.977) respectively. The medial plantar sensory latency mean was 2.8±0.31 msec (ICC= 0.950) while the medial plantar mean amplitude was 28.4±12.2 uV (ICC= 0.754). The medial plantar sensory nerve conduction velocity mean was 41.4±3.5 m/s (ICC= 0.959).

The lateral plantar sensory nerve latency and amplitude means were recorded as 3.2±0.49 msec (ICC= 0.918) and 15.5±8.1 uV (ICC= 0.370) respectively. The lateral plantar sensory nerve conduction velocity mean was 43.9±5.3 m/sec (ICC= 0.946).

Conclusions: There was a high degree of correlation for motor and sensory latency and nerve conduction values and an expected moderate to high correlation for the motor and sensory amplitude values. Tibial motor recording from the FHB and orthodromic sensory medial and lateral plantar conduction studies are reliable measures.

Clinical Relevance: There is little tibial normative data with recording from the FHB muscle. This technique reveals reliable and clear waveforms with easy elimination of the initial negative deflection from baseline that is often found with standard recording from the AH muscle.

KEYWORDS: tibial nerve, flexor hallucis brevis, normative.

TITLE: The Incidence of Adverse Effects from Physical Agents Reported by Physical Therapists Currently Practicing in the State of Michigan

AUTHORS (*last name, first name*): LoVasco, Laura¹; Chapman, Tracie¹; Deloney, Nicole¹; Oi, Nathan¹; Wilson, Lanetra¹; Kincaid, Cynthia¹

INSTITUTIONS (*all*): 1. Physical Therapy Department, University of Michigan-Flint, Flint, MI, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis: The purpose of the study was to identify the incidence of adverse effects caused by the use of physical agents reported by physical therapists practicing in the State of Michigan.

Number of Subjects: 1000 subjects included physical therapists currently practicing in the State of Michigan.

Materials/Methods: 1000 surveys with informed consent were randomly mailed to physical therapists from the 2005 Michigan Physical Therapy licensing board list including ten used for a pilot study.

Results: The pilot survey return rate was 40% (4/10) with no revisions necessary. Total survey return rate was 27% (252/939) with a total of 192 incidents of adverse effects reported. Adverse effects most frequently reported were burn (22%), blister (20%), pain (14%), color change (14%) and rash (6%). The two physical agents

most reported to cause an adverse effect in this study were iontophoresis (29%) and hot pack (26%). Subjects reported that physical agents were applied most often by the primary physical therapist (69%). Adverse effects occurred most frequently in outpatient care (86%).

Conclusions: Therapeutic use of physical agents can cause adverse effects or unintended injury to patients. Future studies would benefit by surveying physical therapists at a national level. This will help in generalizing the data along with increasing awareness the incidence of adverse effects caused by physical agents which are often thought of as low risk patient intervention.

Clinical Relevance: To improve awareness of the occurrence of adverse effects when utilizing physical agents.

KEYWORDS: Physical Agents, Adverse Effect.

TITLE: Current practices in hydrotherapy: Are physical therapists certified as wound specialists choosing pulsed lavage with suction over whirlpool?

AUTHORS (*last name, first name*): Loehne, Harriett B.²; Gibbs, Karen A.¹; Cardenas, Jennifer N.¹; Castillo, Annie¹; Oppenborn, Karli R.¹; Zeng, Xia¹

INSTITUTIONS (*all*): 1. Physical Therapy Department, Texas State University-San Marcos, San Marcos, TX, USA.

2. Archbold Center for Wound Management, Archbold Medical Center, Thomasville, GA, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis: The primary purpose of this study is to determine which form of hydrotherapy, pulsed lavage with suction (PLWS) or whirlpool (WP), physical therapists (PTs) and physical therapist assistants (PTAs) certified as wound specialists are utilizing most frequently and the reasoning behind their choice.

Number of Subjects: Of approximately 1300 subjects, 414 Certified Wound Specialists® (CWS®) participated in our survey - 225 were PTs and 24 were PTAs.

Materials/Methods: An electronic survey consisting of 45 multiple choice and fill in the blank questions was emailed to all CWS® clinicians. Email addresses were obtained from the American Academy of

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Abstracts*Continued from page 7*

Wound Management. Questions addressed demographics, continuing education, and PLWS/WP utilization including infection control and patient diagnosis. Data regarding APTA membership was also collected from physical therapy practitioners. Data analysis included frequency counts and correlational statistics.

Results: Respondents: 249 PTs and PTAs from 38 states practicing primarily in acute care or outpatient settings participated in the survey. Eighty therapists reported working 100% in wound management and 99 reported more than 10 years of content area experience. APTA Membership: 69, with 37 members of the Section on Clinical Electrophysiology and Wound Management. Continuing Education: The majority of respondents participated in at least 1 course per year related to wound management. PLWS/WP Utilization: There was almost an even split between therapists using both PLWS and WP at 33.3% and those using neither at 32.9%, with 9.2% using only WP. Factors that influenced use included PSI, edema, patient status, physician orders, and ease of use. Infection Control: The most popular type of personal protective equipment (PPE) was nonsterile gloves for WP use and eye protection with PLWS. The data also indicated a small number of therapists reusing PLWS tips for treatments on the same patient. Diagnosis: The most common diagnoses for PLWS use were surgical, pressure, traumatic, and neuropathic wounds. For WP, the most common were burns, traumatic, surgical, and neuropathic.

Conclusions: Physical therapists who have the CWS® credential and are recognized as experts are either not using PLWS for wound management or are still using WP as well as PLWS. Although the majority report they attend at least one continuing education course per year, they are woefully lacking in knowledge of appropriate PPE.

Clinical Relevance: The responses from this survey indicate that continuing education is needed concerning the choice of PLWS as the gold standard when irrigation and debridement is required. Education concerning infection control is imperative to avoid the spread of drug resistant organisms which can lead to increased morbidity and even mortality.

KEYWORDS: physical therapy, pulsed lavage with suction, whirlpool.

TITLE: Efficacy of dexamethasone delivered via iontophoresis for treatment of the rheumatoid arthritic elbow:

Case report.

AUTHORS (*last name, first name*): Lonemann, M. E.¹; Hare, Jennifer²

INSTITUTIONS (*all*): 1. Bellarmine University, Louisville, KY, USA.
2. Bellarmine University, Louisville, KY, USA.

SECTION: Clinical Electrophysiology and Wound

ABSTRACT BODY:

Background & Purpose: Iontophoresis is frequently used for reduction of pain and edema. Often it is used in combination with other interventions such as other modalities or therapeutic exercise. Iontophoresis as an intervention for the rheumatoid arthritic knee joint has been studied, but to our knowledge no reports of this intervention for the rheumatoid elbow have been described. This case report describes the use of a single modality--iontophoretically driven dexamethasone for treatment of the elbow of a 36 year old male with rheumatoid arthritis.

Case Description: The 36 year old male with rheumatoid arthritis affecting the left elbow received iontophoretically driven dexamethasone three times a week for four weeks. Treatment dosage of dexamethasone was 40mA/min with the current amplitude adjusted to deliver the medication over approximately a 15 minute period. Location of steroid entry was posterior and inferior to the lateral epicondyle at the joint line of the elbow. Objective measures taken at each visit included active range of motion (ROM) of the elbow and forearm, hand grip dynamometry, manual muscle test of the elbow and wrist, and visual analogue scale (VAS) recording of tenderness to palpation, subjective report of function and pain. Written outcome measures were taken at the initial visit and thirty days later. Outcome measures include the Disabilities of the Arm, Shoulder and Hand (DASH) and the Short Form 36 (SF36) Health Survey.

Outcomes: By week four the client subjectively reported less pain with function and decreased tenderness to palpation as measured by a subjective scale from one to four. This client also demonstrated increased active elbow ROM, increased strength as measured by manual muscle testing and a 5kg/m improvement in grip strength. DASH scores were improved overall by 32% and within the work module by 50%. The SF36 scores were improved in the physical function summary score from 28.9 to 37.5.

Discussion: This case report demonstrated that a 12-week regimen of iontophoresis with dexamethasone given as the only intervention to a patient with rheumatoid arthritis of the elbow was helpful in improving subjective and functional outcome measures.

KEYWORDS: iontophoresis, rheumatoid arthritis, elbow.

TITLE: Modulating frequency of TENS reduces development of analgesic tolerance

AUTHORS (*last name, first name*): deSantana, Josimari M.¹; Sluka, Kathleen A.¹

INSTITUTIONS (*all*): 1. Physical Therapy and Rehabilitation Science, University of Iowa, Iowa City, IA, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis: The analgesia produced by low and high frequency TENS is mediated by activation of μ - or δ -opioid receptors, respectively. Repeated administration of low and high frequency TENS leads analgesic tolerance on the fourth day with a corresponding cross-tolerance at spinal μ - or δ -opioid receptors, respectively. Since simultaneous administration of μ - and δ -opioid agonists reduces analgesic tolerance we hypothesized that repeated administration of modulating frequency TENS (either mixed or alternating) will prevent the development of tolerance.

Number of Subjects: Eighteen male Sprague-Dawley rats were randomly divided into the following groups: sham (n=6), mixed frequency TENS (n=6), and alternating frequency TENS (n=6).

Materials/Methods: Knee joint inflammation (3% carrageenan/kaolin) was induced in adult Sprague-Dawley rats. Beginning 24h after induction of inflammation, either mixed (4Hz and 100Hz administered at the same session for all treatments) or alternating frequency (4Hz and 100Hz administered on alternating days) was administered daily (20 min) for 2 weeks to the inflamed knee joint under light halothane anesthesia (1-2%). Sham TENS rats were administered anesthesia and had electrodes placed on the knee joint for the same period. Paw and joint withdrawal threshold were assessed before and after application of TENS daily during the 2 weeks of treatment. A repeated measures ANOVA compared differences across time and between groups. Post-hoc testing between groups was performed with a Tukey's test and across time with a paired t-test; $p < 0.05$ was considered significant.

Results: Injection of carrageenan reduced the withdrawal threshold of the paw and joint for at least 2 weeks. The reduced paw and joint withdrawal thresholds that occur 24h after the induction of inflammation were significantly reversed by the first administration of TENS when compared to sham or prior to TENS treatment. By the ninth day, repeated daily administration

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of either mixed or alternating frequency TENS no longer reversed the decreased paw and joint withdrawal thresholds and was significantly less than the effect of TENS on day 1. There were no differences between groups on the 9th-14th days after TENS when compared to sham or prior to TENS treatment on the same day.

Conclusions: These data suggest that repeated administration of modulating frequency TENS results in development of opioid tolerance. However, this tolerance effect is delayed by approximately 5 days when compared to administration of low or high frequency TENS independently.

Clinical Relevance: Clinically, we can infer that repeated daily TENS administration will result in a tolerance effect. Moreover, modulating low and high frequency TENS produces better analgesic effect since tolerance is slower to develop.

KEYWORDS: pain, inflammation, hyperalgesia.

TITLE: An Evidence Based Approach to the Treatment of Pyoderma Gangrenosum: The Great Debridement Debate

AUTHORS (*last name, first name*): Lasiter, Bobby¹; Bruder, Monica¹; Sneed, Johanna¹; Riolo, Lisa¹

INSTITUTIONS (*all*): 1. Physical Therapy, Indiana University, Indianapolis, IN, USA

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose: The purpose is to further the understanding of pyoderma gangrenosum (PG) as it relates to the physical therapy patient care management model and the most efficacious interventions currently available. PG is a rapidly evolving and highly debilitating disorder, but with early detection can be controlled.

Description: Searches were performed through Ovid Medline revealed articles ranging in date from 1950 to current. The research was narrowed by limiting the search to full text, English articles involving humans only. Finally, an assessment of the most current evidence and peer reviewed case studies with a focus on surgical debridement of PG was performed with the most relevant articles. Content will be updated through February 2008 to achieve the purposes of this presentation.

Summary of Use: Currently, few articles detail successful management of PG through surgical debridement. One cause for this is "pathergy", a phenomenon where interventions lead to damage of healthy tissue in the patient. Tallon et al. (2006) reported that as much as 40% of lesions

display this pathergy phenomenon, which can cause extensive damage. Despite this, Niezgod et al. (2004) reported successful tissue healing with a combined therapeutic approach using hyperbaric oxygen therapy, early/aggressive surgical excision, and vacuum-assisted closure.

Despite the limited evidence for surgical interventions there is a clear path for managing patients with PG. This includes health care cooperation between physical therapy local wound care and medical control of the inflammatory process. Early diagnosis and an evidence based approach to the intervention of patients with PG can lead to better outcomes for the patient.

Importance to Members: An understanding of the pathological process, lesion characteristics, and treatment options for PG is available to therapists through evidence based practice. These benefits will afford a therapists better functioning within a therapeutic scope of practice, as well as making recommendations on the patient's behalf.

Tallon B, Rademaker M, Parkinson G, Whitley B, Swarbick MJ. Cavitary pyoderma gangrenosum treated with local infusion of corticosteroid. *J Am Acad Dermatol.* 56(4):696-9, 2007.

Niezgod JA, Cabigas EB, Allek HK, Simanonok JP, Kindwall EP, Krumenauer J. Managing pyoderma gangrenosum: A synergistic approach combining surgical debridement, vacuum-assisted closure, and hyperbaric oxygen therapy. *Plast Reconstr Surg.* 117(2):24e-28e, 2006.

KEYWORDS: Pyoderma Gangrenosum, Debridement.

TITLE: The effect of whole body vibration on muscle power, tibial nerve function, and vibration perception

AUTHORS (*last name, first name*): Lester, Mark E.¹; Galloway, Kathleen M.²; Catrambone, Daniel E.¹; Nicholson, Robert O.¹; Evans, Rachel K.¹

INSTITUTIONS (*all*): 1. United States Army Research Institute for Environmental Medicine, Natick, MA, USA. 2. Oakland University, Rochester, MI, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis: This study evaluated the effect of a low amplitude vibration intervention on jump height, power, energy and velocity characteristics, as well as tibial motor and sensory function and vibration perception threshold.

Number of Subjects: Eighty healthy female subjects between the ages of 18 and 35 (mean age 23.6 +/-2.7) years were studied.

Materials/Methods: This was a 2 X 4 repeated measures factorial design. Forty

subjects were randomly assigned to the intervention group and forty subjects were randomly assigned to the control group. Subjects in the intervention group were asked to stand on a vibration platform (Juvent Inc, Somerset NJ) in their home for two ten-minute sessions per day, five days per week for 6 months. Compliance was tracked within the vibration plate and with subject logs, which were verified at the conclusion of the study. Five subjects from the intervention group failed to complete the study. Muscle power assessment was completed at baseline and again at 6 months. The Leonardo Ground Reaction Force Platform (Orthometrix, Inc., White Plains, NY) was used to evaluate lower extremity force and power during double and single limb jumps. Recorded parameters were power (W), velocity (m/sec), peak velocity (m/sec), displacement (m) and work (J). Tibial nerve data was collected using a Sierra LT EMG (Cadwell, Kennewick, WA) machine at baseline, 2, 4 and 6 months. Tibial motor studies of the medial plantar branch were recorded from the flexor hallucis brevis muscle. Tibial sensory studies were recorded orthodromically from the medial and lateral plantar nerves. Recorded values included nerve conduction velocity, amplitude and latency. Vibration perception threshold was also tested at baseline, 2, 4 and 6 months and recorded in microns using a Vibratron II device (Physitemp Inc, NJ). Data was analyzed using a repeated measures ANOVA. This was done with all subjects and then repeated with only subjects having 90% compliance or better.

Results: There was no significant difference in any muscle power, vibration perception threshold or tibial nerve conduction measure when all subjects were included in the analysis. When analyzing subjects who were determined to be at least 90% compliant significant improvements were observed for the following measures: tibial sensory amplitude (lateral plantar branch) (p=0.02), jump height (kinetic energy) (p=0.026) and maximum velocity (p=0.042).

Conclusions: High compliance with a 6-month vibration intervention yielded improvements in jump characteristics and in lateral plantar sensory amplitude.

Clinical Relevance: Whole body vibration (WBV) at < 0.3g amplitude and a 30 Hz frequency may provide some benefit in muscle power and possibly in nerve function in healthy young women. No detrimental effects of WBV on vibration perception, tibial nerve function or muscle power were observed. More long term studies of this type of device with both a normal and patient population are

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warranted.

KEYWORDS: whole body vibration, muscle, nerve.

TITLE: Physical therapy management of hyperhidrosis using commercial iontophoresis device

AUTHORS (*last name, first name*):

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INSTITUTIONS (*all*): 1. Krannert School of Physical Therapy, University of Indianapolis, Indianapolis, IN, USA. 2. Louisiana State University Health Sciences Center, Shreveport, LA, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Background & Purpose: The role of physical therapy in management of hyperhidrosis (HH) is not well defined despite considerable evidence that electrical stimulation (ES) attenuates the primary symptoms of HH. Consequently, patients with HH represent a potentially untapped source of patient referrals from dermatology and primary care physicians. Much of the data supporting use of ES for HH have used devices that are unavailable to most clinicians or out of production. Consequently, many therapists remain unaware of their potential to effectively treat HH. However, nearly all studies reporting effective use of ES have used direct current (DC), the same current in widely available and commonly used iontophoresis units. Thus the potential for clinical management of HH exists but little data are available describing the effectiveness of clinical iontophoresis units in management of HH. Therefore, this case report addresses the management of HH in two patients using a commercially available, clinical iontophoresis device.

Case Description: Two male subjects (ages 25 and 26) with greater than 10 year history of bilateral palmar hyperhidrosis and no prior treatment were examined. Sweat production was quantified by gravimetric assessment. Following a stress task to provoke sweating, each hand was placed on pre-weighed sheets of microabsorbent hydrofiber dressing for 1 minute then re-weighed to the nearest 1/10th of a milligram. Two qualitative assessments of sweat production were also conducted; the Minor starch-iodine test and ninhydrin amino acid reactivity test. These tests assessed the area and density of sweat involvement by staining for excessive sweat production. Serial digital photography of the involved areas yielded qualitative documentation of treatment outcomes. Both quantitative and qualitative measures were performed

before and after intervention. ES with direct current output was delivered using a 9-volt battery operated iontophoresis device. Shallow 6x9 inch plastic pans were filled with tap water. To each pan was attached either the anodal or cathodal lead of a single channel. Following submersion of the hands, the amplitude was increased to 4.0 mA for 10 minutes (40 mA/min dosage) after which the amplitude was returned to 0 and the polarity in each pan was switched for another 10 minutes at 4.0 mA. Subjects were treated once daily for 5 days per week for 2 weeks.

Outcomes: By gravimetric assessment, one subject demonstrated an average 85% reduction in palmar sweat production and the other a 54% decrease. Qualitative assessment showed a remarkable decrease in total surface area and density of sweat production. Six weeks later, each subject reported sustained benefit.

Discussion: Effective management of HH using a clinical iontophoresis device presents a potential source of patients largely unseen by physical therapists and thus an area for increased involvement of physical therapy.

KEYWORDS: hyperhidrosis, iontophoresis, electrical stimulation.

TITLE: Median and ulnar neuropathies in university woodwind players

AUTHORS (**LAST NAME, FIRST NAME**): Epps, Stephanie¹; Goodfred, Adrienne¹; Wilder, Courtney¹; Miller, Jennifer¹; Halle, John S.¹; Greathouse, David G.²

INSTITUTIONS (*all*): 1. School of Physical Therapy, Belmont University, Nashville, TN, USA. 2. Texas Physical Therapy Specialists, San Antonio, TX, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis: A growing trend in research over the last twenty years has been the prevalence of musculoskeletal and neuromuscular disorders of the upper extremities in performing artists, particularly instrumentalists. Due to the amount of time spent in practice and in performance, musicians are at risk for the development of musculoskeletal and neuromuscular disorders of the upper extremities. The purpose of this descriptive study was to determine the presence of neuropathies in the median and ulnar nerves in both upper extremities of university woodwind players.

Number of Subjects: Twelve volunteer woodwind musicians were recruited from three local universities. Bilateral upper extremity testing occurred on each subject (n=24).

Materials/Methods: A history intake

form, an upper quarter neuromuscular screen, and nerve conduction study (NCS), were performed for each subject. The nerve conduction studies were performed on each subject to objectively assess the functional neural status of the median and ulnar nerves. Upon conclusion of the NCS, upper extremity exercises were distributed to each subject. A Cadwell Sierra Wave electromyography unit was used to assess nerve conduction latencies, amplitudes, nerve conduction velocities, and central conduction studies (F-waves).

Results: Eight of twelve subjects (11 of 24 limbs) displayed positive findings during the physical examination, with three of the subjects testing positive bilaterally. Positive findings were operationally defined as reproduction of the subjects symptoms consistent with the test being performed, such as upper extremity numbness or tingling while performing a Phalen's test. Median and ulnar nerve conduction studies were compared to a table of normal values (Blanchfield Army Community Hospital, Fort Campbell, KY). All electrophysiological variables were within normal limits for motor, central (F-wave), and sensory conduction values. Comparisons were also made between the median and ulnar nerve in the same extremity. One subject (5) showed a difference in the distal motor latency of the right arm when comparing these two nerves.

Conclusions: Initial physical exam findings (11 of 24 limbs) pointed towards a significant incidence of neuromusculoskeletal problems. Follow-up nerve conduction study evaluation, a gold standard for evaluating nerve status, identified only one of the twenty-four limbs (4%) studied was found to have true early evidence of a median or ulnar neuropathy. The one finding was a median neuropathy with demonstrated slowing at or distal to the wrist.

Clinical Relevance: While woodwind musicians appear to have a lower incidence of electrophysiologically documented median and ulnar neuropathies than their counterparts as evidenced by past research studies, physical exam findings demonstrate a significant incidence of neuromusculoskeletal symptoms. Based on the overall findings of this research, university level woodwind instrumentalists may benefit from a proactive preventive approach of warm-up, strengthening and stretching of the involved muscles.

KEYWORDS: Median nerve, Ulnar nerve, Neuropathy.

TITLE: New TENS Placebo Allows for True Double-Blinding

AUTHORS (*last name, first name*): Cooper, Nicholas A.¹; Adams, Heather J.¹;

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Granquist, Matthew J.¹; Messer, Bryan R.¹; Frey Law, Laura A.¹; Rakel, Barbara A.²; Vance, Carol G.¹; Sluka, Kathleen A.¹

INSTITUTIONS (all): 1. Graduate Program in Physical Therapy & Rehabilitation Science, The University of Iowa, Iowa City, IA, USA. 2. College of Nursing, The University of Iowa, Iowa City, IA, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis: The primary purpose of this study was to determine if subjects and examiners could be blinded when using a new transient placebo TENS device. We hypothesized that subjects and examiners would be blinded to the transient placebo TENS and active TENS treatment. In addition, we sought to test the effectiveness of high-frequency TENS on 1) temporal summation from tonic heat and pressure stimuli and 2) heat and pain thresholds. Temporal summation refers to the increased perceived intensity of pain over time with a tonic noxious stimulus and is thought to reflect the CNS's response to pain. We hypothesized that TENS would reduce temporal summation and increase pain threshold.

Number of Subjects: 36 healthy adults (males=17, females=19) were randomly divided into three groups using the randomization and allocation concealment method. The groups received the old placebo, the transient placebo, or active TENS treatment. Exclusion criteria included previous TENS experience, pregnancy, history of MI, stroke or other serious injury.

Materials/Methods: After informed consent, pain sensory measures were assessed on the subject's forearm extensor surface. Pain thresholds and temporal summation using heat and pressure stimuli were determined before and after TENS treatment. TENS was applied to the forearm, bracketing the test sites. Active TENS was applied at 100Hz, 100µsec, sensory intensity. The transient placebo TENS was also applied at 100Hz, 100µsec, sensory intensity for a total of 40s, allowing the examiner to set the unit to the desired intensity before ramping down. The old placebo was a malfunctioning unit that appeared to work, although no current was delivered. TENS treatments were 20 minutes and the units were left on during the post test period. A repeated measures ANOVA compared differences across time and between groups for temporal summation and threshold measures.

Results: The experimenter was completely blinded to the transient placebo TENS treatment, identifying it as active TENS

every time. The experimenter was not blinded to the old placebo TENS, identifying it as a placebo every time. The subjects were able to correctly identify the old placebo 70% of the time, the transient placebo 64% of the time, and the active TENS treatment 93% of the time. Baseline pain measures were similar between groups. High-frequency TENS at sensory intensity had no effect on pain thresholds or temporal summation. However, a sub-analysis indicated a significant difference in pressure pain threshold with TENS intensities of 15mA or greater compared to those intensities <15mA ($p<0.05$, t -test).

Conclusions: The experimenter can be blinded to TENS treatment only with the transient placebo. However, the subjects were similarly blinded to the old and transient placebos. High-frequency TENS, at higher intensities, may reduce pressure pain.

Clinical Relevance: The transient TENS placebo will allow for true double-blinded randomized clinical trials of TENS in painful conditions. Further research is warranted to determine the effect of intensity on reducing pain measures.

KEYWORDS: TENS, Placebo, Pain.

TITLE: Radial nerve innervation of the first dorsal interosseous muscle

AUTHORS (last name, first name):

Brokaw, Jamie¹; Craig, Steve¹; DeNeal, Sarah¹; Morris, Kimberly¹

INSTITUTIONS (all): 1. Belmont University, Murfreesboro, TN, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis: A recent cadaver study presented at the Southeastern Society for Plastic and Reconstructive Surgeons described that 25% of the superficial radial nerves investigated sent a contributing nerve branch into the first dorsal interosseous (1DI) muscle. This high degree of atypical anatomical variation was not expected, since the 1DI muscle is normally viewed as an ulnar innervated muscle. The purpose of this study was to explore this possible superficial radial nerve (SRN) innervation of the 1DI muscle in an alternate way, using functional electrophysiological tests on living subjects.

Number of Subjects: Twenty (10 female, 10 male) subjects between the ages of 18-40 were invited to participate in this study. Subjects were provided an informed consent, a medical screening questionnaire and an upper quarter screen. Any subject with a history or evidence of a neurological impairment, or upper extremity injury within the past 6 months, was excluded from the study.

Materials/Methods: A coin toss was used

to randomly select upper extremity tested first. Subjects were positioned supine and standard antidromic sensory nerve conduction procedures were used for the SRN. Following identification of the optimal supramaximal SRN stimulation location at a distance of 10 cm proximal to the pick-up electrode, disposable electrodes were secured to these sites and tested again to insure proper electrode placement. The clip electrodes were removed (disposal electrodes remained secured), and a second set of disposal electrodes were affixed along the path of the ulnar nerve. The 1DI muscle was cleaned with alcohol, and a 27 gauge sterile monopolar needle electrode was inserted into the muscle. A reference surface electrode was placed just distal to the needle electrode and the ulnar nerve was stimulated. The obtained clear compound motor action potential (CMAP) was used to confirm the correct placement of the needle electrode in the 1DI muscle. Following generation of a clear CMAP, the clip electrodes were again attached to the disposable electrodes along the SRN, and the subject was stimulated. This procedure was performed on both upper extremities. A Cadwell Sierra Wave electromyography unit was used to assess nerve conduction latencies and amplitudes.

Results: In every case, ulnar nerve stimulation resulted in the clear elicitation of a CMAP in the 1DI muscle. In none of the 40 limbs investigated did stimulation of the SRN result in a CMAP in the 1DI muscle. Descriptively and statistically, the obtained findings do not support common atypical anatomical innervations of the 1DI by the SRN ($p\leq 0.01$).

Conclusions: The 1DI muscle is typically ulnarly innervated.

Clinical Relevance: This functional testing of the 1DI muscle demonstrated the commonly accepted innervation of this muscle by the ulnar nerve. The data from this research supports a strictly sensory role of the SRN, limiting rehabilitation options for the 1DI muscle in the presence of a deep ulnar nerve lesion.

KEYWORDS: superficial radial nerve, first dorsal interosseous, nerve conduction study.

TITLE: Wound Healing Utilizing Automated Lymphedema Therapy A Case Series

AUTHORS (last name, first name): Betz, Caren L.¹

INSTITUTIONS (all): 1. Rehab Services, Brackenridge Hospital, Austin, TX, USA.

SECTION: Clinical Electrophysiology and Wound Management

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ABSTRACT BODY:

Background & Purpose: Purpose: Edema is a major factor in slow or absent wound healing¹⁻⁵. Use of pneumatic pumps has impacted healing of long-standing chronic venous ulcers and other wounds^{6,7}. Herein we report on our experience with a new automated compression device* that simulates manual lymphatic drainage to reduce edema and its use to promote ulcer healin.

Case Description: Methods: Four patients, three with non-healing leg ulcers and one with a trunk wound, were referred for outpatient wound care. All had edema or lymphedema. Wound care included irrigation, debridement of nonvitalized tissue, and dressings to promote moist healing. Patients were scheduled to be seen three times a week in clinic. Device use was initiated concomitantly with wound treatment for three patients and after two weeks of wound treatment for the fourth.

Outcomes: Results: Each patient exhibited marked improvement at the wound site after treatment with the device. Outcomes observed included immediate significant reduction in wound depth and expedited wound closure or reduction of wound size accompanied by reduction in edema. The device was well tolerated.

Discussion: Conclusion: These results suggest that this device may provide a new therapeutic option in wound healing. Further study is appropriate.

* Flexitouch® Lymphedema System, Tactile Systems Technology, Minneapolis, MN

1. Hofman D. Oedema and the management of venous ulcers. *J Wound Care.* Jul 1998;7(7):345-348.

2. Hofman D. Oedema and its treatment. *J Wound Care.* Jul 1998;7(7 Suppl):suppl 10-13.

3. Macdonald JM. Wound healing and lymphedema: a new look at an old problem. *Ostomy Wound Manage.* Apr 2001;47(4):52-57.

4. McDonagh PF. The microvascular pathophysiology of chronic venous insufficiency. *Yale J Biol Med.* Jan-Feb 1993;66(1):27-36.

5. Mortimer PS. Evaluation of lymphatic function: abnormal lymph drainage in venous disease. *Int Angiol.* Sep 1995;14(3 Suppl 1):32-35.

6. McCulloch, J.M., et. al. Intermittent pneumatic compression improves venous ulcer healing. *Adv.Wound Care* Jul 1994;7(4):22-4, 26.

7. Berliner E, Ozbilgin B, Zarin DA. A systematic review of pneumatic compression for treatment of chronic venous insufficiency and venous ulcers. *J Vasc*

Surg. Mar 2003;37(3):539-544.

KEYWORDS: Wound Care, Lymphedema, Wounds.

TITLE: Implementation of Maggot Debridement Therapy and Enzymatic Debridement on a Patient with Multiple Stage IV Pressure Ulcers

AUTHORS (*last name, first name*): Matheny, Connie¹; Holtz, Robin¹

INSTITUTIONS (*all*): 1. Physical Therapy, Southwest Baptist University, Bolivar, MO, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Background & Purpose: This case report describes the wound care regime of a 46 year old female that presented with multiple stage four pressure ulcers and lacerations. The patient's past medical history included obesity and surgical debridement of pressure ulcers. The patient was admitted to the intensive care unit directly from a nursing home. The onset of the multiple stage four pressure ulcers was a direct result of decreased functional mobility associated with morbid obesity leaving the patient confined to her bed.

Case Description: The multiple stage four pressure ulcers were located on bilateral lower extremities and lacerations located on both breasts. Daily physical therapy was initiated consisting of extraordinary means of wound care including maggot debridement therapy (MDT) and the use of enzymatic debridement creams: Accuzyme and Panafil.

Outcomes: Following three weeks of intensive wound care treatment all wounds were clean and free of necrotic tissue.

Discussion: This case demonstrates that MDT and enzymatic debridement are effective ways to create a healthy wound bed by removing necrotic tissue in preparation for the body to initiate wound healing.

KEYWORDS: Maggot Debridement Therapy, Enzymatic Debridement.

TITLE: Use of low frequency non-contact ultrasound* to assist with debridement in wounds with varying etiologies

AUTHORS (*last name, first name*): Turkos, Marcy A.¹; Gardner, Jennifer A.¹; Wallace, Nia C.¹

INSTITUTIONS (*all*): 1. Physical Therapy, St. Agnes Continuing Care Center, Philadelphia, PA, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Background & Purpose: It is well accepted that debridement of nonviable tissue from the wound bed is essential to improve healing time. In some patients with complicated wounds, aggressive debridement may

not be tolerated, so alternative methods of debridement must be considered.

Case Description: This case study represents three necrotic wounds of different etiologies that were unable to undergo sharp or surgical debridement due to the patients' medical complications. Low frequency non-contact ultrasound was initiated on all of these wounds ranging in size from 16 sq cm to 50 sq cm.

Outcomes: After completion of 5-7 ultrasound sessions in coordination with conservative debridement methods, these wounds were free of necrotic tissue and were shown to have a significant decrease in overall wound dimensions.

Discussion: This case study suggests that the use of low frequency non-contact ultrasound may be a strong adjunctive therapy to assist with debridement and healing in necrotic wounds unable to withstand aggressive sharp or surgical debridement.

* MIST™ Therapy, Celleration, Eden Prairie, MN

References:

Sussman, C et. al. *Wound Care, A Collaborative Practice Manual for Physical Therapists and Nurses*, Second Edition. Aspen Publishers; 2001:197.

Thawer et. al., A pilot study examining the effects of ultrasound mist therapy (UMT) on the size and appearance of chronic pressure ulcers; Presented at SAWC 2002.

KEYWORDS: wound healing, debridement, non-contact ultrasound.

TITLE: Effect Of Immediate And Long-Term Use Of Z-Coil® Shoes On Surface EMG Activity In The Lower Extremity During Gait

AUTHORS (*last name, first name*):

Allen, Donald¹; Alexander, Nikki¹; Rasmacher, Lisa¹; Sherman, Travis¹; Vetter, Thomas¹

INSTITUTIONS (*all*): 1. Physical Therapy, University of Mary, Bismarck, ND, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis: Z-Coil® shoes have a spring in the heel and are used to relieve pain in the lower extremity and back. The spring reduces the forces placed on the lower extremity during gait and stance. We examined muscle activity by measuring electromyographic (EMG) activity. Nenow et al (unpublished, 2006) reported an immediate increase in EMG activity of the fibularis longus muscle while walking at 3 mph. However, the effects of long term use of the Z-Coil® shoes was not determined. The purpose of this study was

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to evaluate a 3-month training effect of wearing Z-Coil® shoes on individual lower extremity muscles during stance and gait. **Number of Subjects:** Subjects were 10 healthy university students.

Materials/Methods: Z-Coil® shoes were donated by the Z-Coil® shoe company (San Antonio, TX) and were individually fitted by the Z-Cooler Shoe Company (Bismarck, ND). Surface electrodes were applied over the fibularis longus, tibialis anterior, and soleus muscles. Cables were attached to a 8-channel Noraxon Myosystem 1200 EMG system (Noraxon USA, Inc., Scottsdale, AZ). Data were analyzed using MyoResearch 2.0 software (Noraxon USA, Inc.). Initial EMG measurements were taken with the subjects wearing their regular everyday footwear during standing, walking at 3 mph, and running at 6 mph. Five days later, subjects received their Z-Coil® shoes and measurements were taken with subjects wearing both their regular shoes and the Z-Coil® shoes. After 3 months of Z-Coil® shoe use, final EMG measurements were taken. EMG activity for each muscle was normalized to the resting EMG activity for that muscle during that session.

Results: When subjects were standing, there was no change in EMG activity between any of the conditions. When subjects initially starting wearing the Z-Coil® shoes, there was an increase in EMG activity of the fibularis longus muscle during walking in Z-Coil® shoes ($p=.006$). In contrast, there was a decrease in the EMG activity of the tibialis anterior muscle during running while subjects wore the Z-Coil® shoes ($p=.038$). After 3 months of Z-Coil® shoe use, there was no statistical difference ($p>.05$) in EMG activity data between the Z-Coil® and regular shoes in all ambulatory conditions.

Conclusions: The increase in fibularis longus EMG activity is likely a result of increased lateral instability at the ankle. The spring in the Z-Coil® shoes provides cushioning during heel strike, decreasing the need for eccentric contraction of the tibialis anterior muscle. The reason for no effect on EMG activity after 3 months of shoe use is unclear, but may be due to adaptation to the shoes or changes in gait pattern.

Clinical Relevance: The use of Z-Coil® shoes results in immediate changes in activity of the fibularis longus and the tibialis anterior muscles. These changes could be of benefit to patients requiring a fibularis longus strengthening program or to decrease the load placed upon the tibialis anterior muscle. Conversely, the Z-Coil® shoes would not be recommended to patients with ankle instability due to increased load

on the fibularis longus muscle.

KEYWORDS: Surface EMG, Lower Extremity, Spring Shoes.

TITLE: Noncontact Ultrasound Therapy* for Nonhealing Trauma Wounds Complicated by Necrosis and Undermining

AUTHORS (*last name, first name*):

Anderson, Molly¹; Drew, Angela¹

INSTITUTIONS (*all*): 1. Methodist Hospital wound clinic, St. Louis Park, MN, USA.

SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Background & Purpose: Background and Purpose: Noncontact ultrasound therapy at a frequency of 40 kHz (low frequency) and a therapeutic range of 0.3-0.8 W/cm² (low-intensity) is a newer modality to promote wound healing through wound cleansing and maintenance debridement by removing yellow slough, fibrin, tissue exudates, and bacteria. Four clinical investigations, including 2 randomized controlled trials, have demonstrated improved healing compared with the standard of wound care in chronic wounds of diabetic, pressure, and ischemic origin.

Case Description: Case Descriptions: We report 3 cases in which we administered noncontact ultrasound therapy to treat trauma-related wounds complicated by necrosis and undermining. Patient 1 was a 78-year-old female with a laceration wound on her right knee resulting from a fall. Medical history included dementia, squamous cell cancer (face), lymphoma, and hemolytic anemia. The wound was necrotic and appeared to have an increased bacterial load. Noncontact ultrasound was administered 3 times/week for 2 months and the wound was dressed with antimicrobial/bacteriostatic and foam dressings. Patient 2 was a 44-year-old female with a nonhealing surgical incision wound of 2 months duration resulting from abdominal hysterectomy. Medical history included type 2 diabetes, irritable bowel syndrome, and multiple psychological disorders. The wound was MSRA+ and undermining was present at 3:00 (3.0 cm) and 9:00 (3.5 cm). Undermining continued to be a problem despite pulsed lavage, NPWT, and therapeutic debridement. Noncontact ultrasound was administered for 2 months with bacteriostatic, matrix, and saline-moistened gauze dressings. Patient 3 was a 64-year-old female with a lower extremity wound of 6 weeks duration secondary to a car accident. Medical history included hypertension. Copious amounts of necrotic tissue were present as well as undermining (0.5 to 1.9 cm) at 1:00, 5:00,

7:00, 9:00, and 10:00. Initial treatment with antimicrobial, bacteriostatic, and pulsed lavage did not progress the wound.

Outcomes: Outcomes: Patient 1 – After 2 months of noncontact ultrasound treatment, granulation tissue had formed over 90% of the wound. Closure was achieved 2 weeks later. Patient 2 – After 6 weeks of noncontact ultrasound, 100% granulation tissue was achieved and undermining was eliminated. The wound closed 4 weeks later. Patient 3 – After 7 weeks of noncontact ultrasound, undermining was eliminated and 60% granulation tissue was achieved. Four weeks later, 100% granulation tissue was present.

Discussion: Discussion: In this case series, noncontact ultrasound therapy reduced necrosis and undermining and promoted granulation tissue formation in nonhealing wounds of traumatic origin complicated by necrosis and undermining.

KEYWORDS: wound healing, noncontact ultrasound therapy.

TITLE: Application of high (HFS) and low frequency (LFS) transcutaneous electric nerve stimulation to skin located contralateral to a nerve injury alters allodynia and dorsal horn neurotransmitter content in rats.

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SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis: Using a rat model of neuropathic pain, we previously reported that HFS and LFS can reduce mechanical and thermal allodynia, respectively, when delivered contralateral to a nerve injury. More recently we reported that combining these treatments by delivering them on alternate days reduced both forms of allodynia. The purpose of the present study was to examine the content of dorsal horn neurotransmitters when HFS and LFS were delivered alone or in combination.

Number of Subjects: One hundred rats. **Materials/Methods:** 77 rats received a chronic constriction injury (CCI) to the right sciatic nerve. This procedure produces mechanical and thermal allodynia that is reminiscent of that experienced by humans with neuropathic pain. On the day of surgery, 23 of these rats received either HFS or LFS for one hour to skin and acupuncture points, respectively, located contralateral to the nerve injury. On the day after surgery, rats received the treatment they did not

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receive the previous day. This pattern was repeated for a total of 12 days of treatment. 14 CCI rats received only contralateral daily HFS, 12 CCI rats received only contralateral daily LFS and 28 were untreated. An additional 23 rats did not receive a CCI and served as naive controls. Mechanical and thermal pain thresholds of the right paw were assessed prior to the CCI (baseline) and again 12 days after CCI or on an analogous day if no CCI occurred. Neurotransmitter content for the right and left dorsal horn was assessed with HPLC and expressed as $\mu\text{g}/\text{mg}$ of protein. Mean pain threshold and neurotransmitter content was compared between groups using an ANOVA and post-hoc pair-wise comparisons. Alpha was 0.05 for all statistics. Some behavioral data has been previously presented.

Results : Mechanical pain threshold was increased over that seen in untreated CCI rats by daily HFS and alternating HFS/LFS. Thermal pain threshold was increased by daily alternating HFS/LFS. There was no difference between right and left dorsal horn content of aspartate (Asp), glutamate (Glu), glycine (Gly) and gamma aminobutyric acid (GABA) in any group examined. When right and left dorsal horn content of neurotransmitters was averaged and the groups compared, only daily alternating HFS/LFS altered neurotransmitter content from that observed in CCI controls. Asp, Glu and Gly, but not GABA, was increased (41-51%) by alternating HFS/LFS.

Conclusions : While contralateral daily HFS or LFS may reduce mechanical and thermal allodynia, respectively, only combining the treatment reduces both. This treatment produces a significant change in pain-related neurotransmitters of the dorsal horn. We believe TENS effectiveness is intimately related to neurotransmission within the spinal cord.

Clinical Relevance : Combining HFS and LFS appears to be a reasonable, physiologically sound strategy for reducing neuropathic pain. This is particularly so, when the treatments are applied contralateral to a nerve injury.

KEYWORDS: TENS, Central Nervous System, Pain Control.

TITLE: Case Studies Demonstrate Effectiveness of Noncontact, Low-Frequency Therapeutic Ultrasound in Complicated Wounds

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SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Background & Purpose : We conducted a case series study in 2006 to determine the effectiveness of noncontact, low-frequency therapeutic ultrasound in complicated wounds.

Case Description : Patients with wounds associated with various comorbidities and etiologies were selected. Treatment effectiveness was determined through changes in wound area dimensions, amount of drainage, percentage of granulation tissue, and wound-related pain (rated 0-10 using a visual analog scale [VAS]). Patients were treated until sufficient granulation tissue formation or re-epithelialization was achieved. Seven patients were selected from an outpatient physical therapy wound management clinic. With the exception of a full-thickness burn to the trunk, wounds occurred on the lower extremities and were associated with diabetes,

venous insufficiency, spider bite, community-acquired MRSA, pseudomonas, and/or sickle-cell anemia. Patients received 5-26 treatments for <2-13 weeks, depending on wound size.

Outcomes : Once ultrasound treatment started, wound-associated pain was reduced or eliminated, even in one wound initially rated 10 on the VAS. Time-to-healing was rapid compared with our clinical experience treating similar wounds associated with similar comorbidities.

Discussion : This case study series demonstrated that noncontact, low-frequency therapeutic ultrasound was associated with reduced wound-related pain and increased healing rates in complicated wounds of various etiologies.

KEYWORDS: low-frequency therapeutic ultrasound, wound healing.

TITLE: The impact varying stimulation intensity and contraction type on the force-frequency relationship in human skeletal muscle during NMES.

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SECTION: Clinical Electrophysiology and Wound Management

ABSTRACT BODY:

Purpose/Hypothesis : Neuromuscular electrical stimulation (NMES) incorporates the use of electrical current to facilitate contraction of skeletal muscle. However, few data exists describing the influence of stimulation intensity or type of contraction on muscle function during NMES. The purpose of this study was to 1) determine the influence of stimulation intensity on the force-frequency relationship and 2) determine the effect of eliciting limb motion

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Clinical Electrophysiology and Wound Management Section

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on this relationship in human skeletal muscle during NMES. We hypothesized that the nature of the force-frequency relationship would be stable across intensities but would differ during static versus dynamic muscle actions.

Number of Subjects : Ten subjects (29.9 ± 6.7 yrs, 174.2 ± 7.4 cm, 72.7 ± 11.6 kg; 8 male) participated in this study.

Materials/Methods : The dominant limb of each subject was tested on a Biodex isokinetic dynamometer (static trials) or a custom built upright chair (dynamic trials) using all possible combinations of frequencies (20, 30, 40, 50, 60, 70 and 100 Hz) and intensities (200, 300, 400, 500, 600 and 700 μ s pulse durations) delivered in random order at a pre-determined current voltage. Muscle output during static (isometric torque [ft*lbs]) and dynamic (leg excursion [°]) contractions was used to determine the torque-frequency and excursion-frequency relationships, respectively.

Results : The predictive ability of the torque-frequency ($y = -8E-5X^2 + 0.0141x + 0.477$; $R^2 = 0.9891$) and excursion-frequency ($y = -7E-05x^2 + 0.012x + 0.4695$; $R^2 = 0.9738$) relationships were extremely strong across stimulation in-

intensities. Of note, the nature of each relationship was best described using a 2nd order polynomial equation. When the various intensity relationships were examined separately, no differences were found in the frequency (50 Hz) nor intensity (500 μ sec) of stimulation which elicited peak torque output during either static or dynamic muscle actions.

Conclusions : The impact of varying stimulation intensity is consistent across a range of stimulation frequencies. Interestingly, the nature of these relationships is also similar in static versus dynamic muscle actions.

Clinical Relevance : The potential for NMES findings to translate to functional electrical stimulation (FES) requires a fundamental understanding of how varying stimulation parameters impacts muscle function and how previous studies that incorporate isometric contractions may relate to dynamic actions. These data demonstrate the inherent stability of the torque- and excursion-frequency relationships is quite strong, thus suggesting the ability to accurately predict muscle responses to changes in stimulation parameters across a range of parametric settings.

KEYWORDS: muscle, electrical stimulation.

Clinical Electrophysiology and Wound Management

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