

University of Kentucky Physical Medicine & Rehabilitation



20TH
ANNUAL PM&R
RESEARCH DAY
June 5, 2008

Cardinal Hill
Rehabilitation Hospital
Center of Learning
2050 Versailles Road
Lexington, Kentucky

UNIVERSITY OF KENTUCKY
DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION
20TH ANNUAL RESEARCH DAY AGENDA

CARDINAL HILL REHABILITATION HOSPITAL
CENTER OF LEARNING, ROOMS CL2, CL3 & CL4
June 5, 2008

- 7:30 a.m. – 8:30 a.m. *Resident Breakfast with Dr. Michael Priebe ~ CL1*
Sponsored By: Byron Coleman, Acorda Therapeutics
- 8:00 a.m. – 8:20 a.m. *Continental Breakfast ~ CL2*
Sponsored By: Wilma Bickers, Pfizer
- 8:20 a.m. – 8:30 a.m. Opening Remarks (CL4): Gerald V. Klim, D.O.

PM&R RESIDENT RESEARCH PRESENTATIONS – CL4

- 8:30 a.m. – 8:40 a.m. Sheila Chandran, M.D., Physical Medicine & Rehabilitation
“Kinematic Biofeedback for Independent Motor Retraining”
- 8:45 a.m. – 8:55 a.m. Bradley Davis, M.D., Physical Medicine & Rehabilitation
“A Clinical Center Follow-Up of Adults with Cerebral Palsy
(Part A)”
- 9:00 a.m. – 9:10 a.m. Ninad Karandikar, M.D., Physical Medicine & Rehabilitation
“A Clinical Center Follow-Up of Adults with Cerebral Palsy
(Part B)”
- 9:15 a.m. – 9:25 a.m. Zach Berry, M.D., Physical Medicine & Rehabilitation
“Using Three-Dimensional Gait Analysis to Discriminate
Between Gait Patterns of Children with Cerebral Palsy/
Spastic Diplegia and Hereditary Spastic Paraplegia”
- 9:30 a.m. – 9:40 a.m. Kristin Caldera, D.O., Physical Medicine & Rehabilitation
“The Effect of Intrathecal Baclofen Implant as Measured
By the Change in Pre-Implant and Post-Implant PODCI Scores”
- 9:45 a.m. – 9:55 a.m. Thomas Coury, D.O., Physical Medicine & Rehabilitation
“Comparison of Lateral Trunk Lean Between Diplegic Cerebral
Palsy and Hereditary Spastic Paraparesis Using Quantitative
Gait Analysis”
- 10:00 a.m. – 10:10 a.m. Silke Bernert, M.D., Physical Medicine & Rehabilitation
“Athletics after Spinal Cord Injury – Impact on Daily Living”
- 10:15 a.m. – 10:25 a.m. Jessica Colyer, M.D., Physical Medicine & Rehabilitation
“Cognitive and Functional Improvement in a Pediatric Patient
with Acute Disseminated Encephalomyelitis Following
Methylphenidate Treatment: A Case Report”

UNIVERSITY OF KENTUCKY
DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION
20TH ANNUAL RESEARCH DAY AGENDA
(Continued)

PM&R RESIDENT RESEARCH PRESENTATIONS – CL4 (Continued)

10:30 a.m. – 10:40 a.m.

BREAK

10:45 a.m. – 10:55 a.m.

Oscar Ortiz, M.D., Physical Medicine & Rehabilitation
“Palliative Intrathecal Baclofen Therapy (ITB) for Upper
Extremity Spasms in a Patient with Amyotrophic Lateral
Sclerosis: A Case Report”

OTHER RESEARCH PRESENTATIONS – CL4

11:00 a.m. – 11:10 a.m.

Patrick O. McKeon, Ph.D., UK/Rehabilitation Sciences
“The Berg Balance Scale Score Significantly Improves in
Those Who Receive Outpatient Physical Therapy Care for
Stroke at Cardinal Hill Rehabilitation Hospital”

11:15 a.m. – 11:25 a.m.

Camille Skubik-Peplaski, MS, OTR/L, Cardinal Hill Hospital
“Common Focus Common Language: Integrating a
Transdisciplinary Approach with the ICF into a Winning
Combination in Rehabilitation”

11:30 a.m. – 11:40 a.m.

Jonathan Lifshitz, Ph.D., Anatomy & Neurobiology, SCoBIRC
“The Fencing Response as an Indicator of Traumatic Brain
Injury Severity”

11:45 a.m. – 11:55 a.m.

Camille Skubik-Peplaski, MS, OTR/L; Lisa Tudor, MBA, CHRH
Designing an Effective Approach to Rehabilitation: Applying
The International Classification of Functioning (ICF)

12:00 a.m. – 12:10 p.m.

Laura Carter, PT; Rachel Gleason, PT, Cardinal Hill Hospital
“The Usefulness of Activity Limitation Following Canalith
Repositioning for Benign Positional Vertigo”

12:15 p.m. – 12:25 p.m.

Patrick Kitzman, Ph.D., UK/Rehabilitation Sciences; Elizabeth
Hunter, Ph.D., Cardinal Hill Hospital
“Establishing a Collaborative Team to Investigate: Health and
Quality of Life Related Challenges for individuals with Spinal
Cord Injury, Living in Medically Underserved Areas of
Kentucky”

UNIVERSITY OF KENTUCKY
DEPARTMENT OF PHYSICAL MEDICINE & REHABILITATION
20TH ANNUAL RESEARCH DAY AGENDA
(Continued)

12:30 p.m. – 1:30 p.m.

Lunch – CL2

Sponsored By: Jane Grunwald, Allergan

POSTER PRESENTATIONS – CL3

12:45 p.m. – 1:30 p.m.

Anshu Chen, Ph.D., UK/Physical Medicine & Rehabilitation
“Comprehensive Differential Proteomic Analysis of Acute
Contusive Spinal Cord Injury in Rats”

Heather Foozer, B.S., UK/Physiology, SCoBIRC
“Histological and Behavioral Effects of Calpastatin Over-
expression after Traumatic Brain Injury in Transgenic Mice”

Manan Jhaveri, M.B.B.S., M.P.H., UK/College of Public Health
“Humidity and Asthma: Is There an Association?”

Sindhu Madathil, Post-Doc, UK/Physiology, SCoBIRC
“Transient Induction of Insulin-Like Growth Factor 1/Insulin-
Like Growth Factor 1 Receptor Signaling in the Mouse Brain
Following Traumatic Brain Injury”

Lumy Sawaki, Ph.D., UK/Physical Medicine & Rehabilitation
“Motor Map Plasticity in Subacute and Chronic Patients
Receiving Constraint Induced Therapy after Stroke”

Radhika A. Vaishnav, Ph.D., UK/Anatomy & Neurobiology,
SCoBIRC
“Combinatorial Strategy for the Treatment of Acute Spinal
Cord Injury”

FEATURE SPEAKER – CL4

1:30 p.m. – 2:30 p.m.

Michael M. Priebe, M.D., Associate Professor
Mayo Clinic, Physical Medicine & Rehabilitation
“Advice for Early Career Researchers”

2:30 p.m. – 3:00 p.m.

Awards & Closing Remarks

Joe Springer, PhD, Physical Medicine & Rehabilitation

Gerald Klim, DO, Chairman, Physical Medicine & Rehabilitation

ORAL PRESENTATIONS

PM&R Resident Presentations

Presenter:

Abstract Presentation:

Sheila Chandran, M.D.

Kinematic Biofeedback for Independent Motor Retraining

Bradley Davis, M.D.

A Clinical Center Follow-Up of Adults with Cerebral Palsy (Part A)

Ninad Karandikar, M.D.

A Clinical Center Follow-Up of Adults with Cerebral Palsy (Part B)

Zach Berry, M.D.

Using Three-Dimensional Gait Analysis to Discriminate Between Gait Patterns of Children with Cerebral Palsy/Spastic Diplegia and Hereditary Spastic Paraplegia

Kristin Caldera, D.O.

The Effect of Intrathecal Baclofen Implant as Measured by the Change in Pre-Implant and Post-Implant PODCI Scores

Thomas Coury, D.O.

Comparison of Lateral Trunk Lean Between Diplegic Cerebral Palsy and Hereditary Spastic Paraparesis Using Quantitative Gait Analysis

Silke Bernert, M.D.

Athletics after Spinal Cord Injury – Impact on Daily Living

Jessica Colyer, M.D.

Cognitive and Functional Improvement in a Pediatric Patient with Acute Disseminated Encephalomyelitis Following Methylphenidate Treatment: A Case Report

Oscar Ortiz, M.D.

Palliative Intrathecal Baclofen Therapy (ITB) for Upper Extremity Spasms in a Patient with Amyotrophic Lateral Sclerosis: A Case Report

ORAL PRESENTATIONS

(Continued)

Other Presentations

Presenter:

Abstract Presentation:

Patrick O. McKeon, Ph.D.,
ATC, CSCS

The Berg Balance Scale Score Significantly Improves
In Those Who Receive Outpatient Physical Therapy
Care For Stroke at Cardinal Hill Rehabilitation Hospital

Camille Skubik-Peplaski, MS, OTR/L

Common Focus Common Language: Integrating a
Transdisciplinary Approach With the ICF Into a
Winning Combination in Rehabilitation

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The Fencing Response as an Indicator of Traumatic
Brain Injury Severity

Camille Skubik-Peplaski, MS, OTR/L
and Lisa Tudor, MBA, BBA, BA

Designing an Effective Approach to Rehabilitation:
Applying the International Classification of Functioning
(ICF)

Laura Carter, PT
Rachel Gleason, PT

The Usefulness of Activity Limitation Following Canalith
Repositioning for Benign Positional Vertigo

Patrick H. Kitzman, Ph.D. and
Elizabeth Hunter, Ph.D., MSOT

Establishing a Collaborative Team to Investigate: Health
and Quality of Life Related Challenges for Individuals with
Spinal Cord Injury, Living in Medically Underserved
Areas of Kentucky

PM&R RESIDENT PRESENTATION

Kinematic Biofeedback for Independent Motor Retraining

Presenter:

Sheila Chandran, M.D.

Collaborators:

Sara Salles, D.O.; Eric C. Hartman, M.S.

Departmental Affiliations:

University of Kentucky Medical Center, Department of Physical Medicine and Rehabilitation

Abstract Text:

Problem: Stroke patients undergo acute rehabilitation to restore functional use in paralyzed limbs. Therapies are utilized to improve motor function at all phases of recovery. During early phase of recovery, current lower extremity techniques are not task specific, causing delay in transfer training, relearning activities of daily living (ADL) and eventual gait training.

Aim: The SymSlide, a closed chain, partial weight bearing lower extremity exercise device, will be used in conjunction with traditional therapy in the earliest stages of rehabilitation. The device will allow patients to practice sit-to-stand movements and weight transfers. A foot plate will record kinematic measurements generated by patient, which will be visible to patient on a video display. Specific tasks will be performed testing static forces, sit-to-stand transitions, postural shifts and holds.

Hypothesis: The use of the SymSlide to provide task specific feedback will expedite patients' progress through early phase of stroke recovery, improving ADL training, and increasing endurance.

Methods: 10 post-stroke patients will be randomized to incorporate the SymSlide therapies as part of therapy sessions. 10 control patients will have traditional physical and occupational therapy sessions. Goal of this Phase 1 study is to test feasibility of integrating the SymSlide into acute post-stroke inpatient rehabilitation therapy.

PM&R RESIDENT PRESENTATION

A Clinical Center Follow-Up of Adults with Cerebral Palsy ~ Part A

Presenter:

Bradley S. Davis, M.D.

Collaborators:

Chester Tylkowski, M.D.; Christin Minter, MA; Ninad Karandikar, M.D.

Departmental Affiliations:

University of Kentucky Medical Center, Department of Physical Medicine & Rehabilitation
Shriner's Hospital for Children, Lexington, Kentucky

Abstract Text:

Cerebral Palsy (CP) is defined as a motor disorder occurring secondary to a static lesion in the developing brain with onset before two years of age. It is associated with excessive lower motor neuron activity that affects body movement, muscle coordination, & posture. The disease also causes a myriad of medical problems that requires of multiple medical subspecialties including: orthopedics, neurosurgery, physiatry, psychiatry, and pediatrics. Ancillary services are also required for nutrition, vocation, psychosocial, and developmental support. Meeting the various needs of these individuals is provided by specialty clinical centers such as the Shriner's Hospitals for Children (SHC). While these hospitals are undeniably successful in providing specialty care for children with CP, they only provide care until the age of 21. When there is no longer access to SHC, obtaining the appropriate care can be a challenge.

We feel there are nine essential issues that affect adults with CP that are no longer receiving services with SHC. These include exercise, women's issues, quality of available medical and dental care, nutrition, conditions that worsen with age, communication, musculoskeletal issues, psychosocial factors, and economics. Are study is to examine the above nine essential issues in relation to ten basic goals in life that are generally important to adults. These goals include: 1) real choices in all aspects of life, 2) functional skills, 3) interaction with a variety of people, 4) inclusion in generic services and activities, 5) access to community resources, 6) use of a range of community environments, 7) living in a typical neighborhood, 8) meaningful daily activity, 9) non-adversarial interactions, and 10) relationships with friends.

Methods: A set of eight questionnaires that address the nine essential issues that affect adults with CP will be administered to individuals that formerly were patients at SHC. Subjects that participate in this IRB-approved study will be asked to complete a series of questionnaires over the telephone. The results will be analyzed descriptively and statistically.

Objective: The results of this study can be used to determine the needs of the aging cerebral palsy population.

Key Words:

Cerebral Palsy, Adult, Quality of Life.

PM&R RESIDENT PRESENTATION

A Clinical Center Follow-Up of Adults with Cerebral Palsy ~ Part B

Presenter:

Ninad Karandikar, M.D.

Collaborators:

Chester Tylkowski, M.D.; Christin Minter, MA; Bradley S. Davis, M.D.

Departmental Affiliations:

University of Kentucky Medical Center, Department of Physical Medicine & Rehabilitation
Shriner's Hospital for Children, Lexington, Kentucky

Abstract Text:

Cerebral Palsy (CP) causes a myriad of medical problems that requires multiple medical subspecialties and ancillary services. Meeting the various needs of these individuals is provided by specialty clinical centers such as the Shriner's Hospitals for Children (SHC). While these hospitals are undeniably successful in providing specialty care for children with CP, they only provide care until the age of 21. When there is no longer access to SHC, obtaining the appropriate care can be a challenge.

This study examines nine essential issues that affect adults with CP in relation to ten basic goals in life that are generally important to adults. Information was gathered through a set of eight questionnaires administered to individuals that formerly were patients at SHC. The results were analyzed descriptively and statistically.

The goal of the study is to determine the needs of the aging cerebral palsy population based on the results obtained.

Key Words:

Cerebral Palsy, Adult, Quality of Life.

PM&R RESIDENT PRESENTATION

Using Three-Dimensional Gait Analysis to Discriminate Between Gait Patterns of Children with Cerebral Palsy/Spastic Diplegia and Hereditary Spastic Paraplegia

Presenter:

Zachary Berry, M.D.

Faculty Mentors/Collaborators:

Chester Tylkowski, MD, Shriner's Hospital; Hank White, MSPT, Shriner's Hospital

Departmental Affiliations:

Shriner's Hospital for Children, Lexington, Kentucky

University of Kentucky Medical Center, Department Physical Medicine and Rehabilitation

Abstract Text:

Objective: To determine if the use of three-dimensional gait analysis can discriminate between the gait patterns of children with cerebral palsy with spastic diplegia to those with hereditary spastic paraplegia, especially with regard to knee flexion/extension.

Proposal: Hereditary spastic paraplegia is a disease process which targets the corticospinal tracts, which in turn results in spasticity that predominates in the lower extremities. Children demonstrate physical exam findings and gait patterns which resemble children with cerebral palsy/spastic diplegia. Often times, treatment of these children is similar, if not identical, to those with spastic diplegia with goals of controlling the spasticity with medications, assistive devices, or surgical procedures. Only one study is known that has used three-dimensional gait analysis in an attempt to differentiate between the gait patterns of hereditary spastic paraplegics and spastic diplegics. One of the results of that study showed that children with HSP and spastic diplegia have a large percentage of cases (50-60%) that demonstrate knee hyperextension during stance phase with a key difference in that the spastic diplegics have accompanied ankle plantar flexion, perhaps explaining the knee extension moment. Initial gross observation of kinematic data showed that children with HSP who have undergone a gait analysis at Lexington Shriners Hospital might have a tendency towards knee hyperextension during the stance phase of gait, more so than their spastic diplegic counterparts. Therefore, I proposed that the HSP group would show a statistically significant difference in knee angles during the stance phase of gait. ***Methods:*** The gait analyses of 21 children with HSP were compared to an age- and GMFCS-matched sample of CP children with spastic diplegia, all of whom have undergone three-dimensional gait analysis at Shriners Hospital in Lexington, KY. Comparison of the kinematic data was performed on initial barefoot studies to include knee angle at initial contact, midstance, and the minimum angle during stance phase. Furthermore, I compared ankle angles at initial contact and during midstance to see if ankle plantar flexion might be present in the setting of knee hyperextension. ***Results:*** Comparison of knee angles during stance phase of gait did not show a statistically significant difference between groups. Our study showed fewer tendencies towards knee extension than the aforementioned study with only 19% of the HSP group and 9% of the SD group showing any evidence of hyperextension during stance phase. All of the subjects had a plantar flexion moment at initial contact, which could contribute all of the cases of knee hyperextension. This contradicts the previous study which stated that HSP children have hyperextension at the knee without concomitant ankle plantarflexion.

KEY WORDS:

Three-Dimensional Gait Analysis, Hereditary Spastic Paraplegia, Spastic Diplegia, Gait

PM&R RESIDENT PRESENTATION

The Effect of Intrathecal Baclofen Implant as Measured by the Change in Pre-Implant and Post-Implant PODCI scores

Presenter:

Kristin Caldera, D.O.

Collaborators:

Susan McDowell M.D.¹ and Todd Milbrandt, M.D.^{2/3}

Departmental Affiliations:

¹University of Kentucky, Department of Physical Medicine & Rehabilitation

²University of Kentucky, Pediatric Orthopedic Surgery

³Shriners' Hospital for Children, Lexington, Kentucky

Abstract Text:

Objectives: To assess whether there is an improvement in PODCI (Pediatric Outcomes Data Collection Instrument) scores in children with cerebral palsy (CP) who undergo intrathecal baclofen (ITB) implant, for the management of spasticity.

Design: Retrospective chart review of patients receiving implants from the years 2000-2007, with available PODCI scores.

Setting: Pediatric Orthopedic and Rehabilitation Specialty Hospital

Participants: Children with cerebral palsy, GMFCS (Gross Motor Function Classification Scale) level IV and V, ages 2-12, who received ITB implants for management of severe spasticity.

Intervention: Intrathecal baclofen therapy in children with cerebral palsy.

Main Outcome Measures: pre intrathecal baclofen implant PODCI and post intrathecal baclofen implant PODCI.

Results: Plan to evaluate and compare the individual PODCI domains, including upper extremity function, transfers and basic mobility, sports and physical function, comfort/pain, global function and symptoms, co morbidity, expectations of treatment, happiness, satisfaction with symptoms, general health and general health change, pre and post ITB implantation. In addition, to evaluate whether the age of the patient at the time of implant may influence certain domains as measured by the PODCI. Finally, to evaluate whether the time in which the pre and post PODCI were completed, influenced the trend of PODCI scores.

Conclusion: Pending statistical analysis.

Key Words:

Intrathecal Baclofen, Cerebral Palsy, Spasticity

PM&R RESIDENT PRESENTATION

Comparison of Lateral Trunk Lean Between Diplegic Cerebral Palsy and Hereditary Spastic Paraparesis Using Quantitative Gait Analysis

Presenter:

Thomas Coury, D.O.

Collaborators:

Hank White, PT, Ph.D.

Departmental Affiliations:

University of Kentucky Medical Center, Department of Physical Medicine and Rehabilitation
Shriner's Hospital for Children, Lexington, Kentucky

Abstract Text:

Hereditary Spastic Paraparesis (HSP) is a familial disorder characterized by a spastic diplegic gait pattern. Very few studies have described the gait pattern in these children compared to acquired spastic diplegic (CP) patients using quantitative methods. Based on empirical observations in the gait lab, it is felt that HSP patients tend to utilize more lateral trunk lean than CP patients. The purpose of this study was to compare the lateral trunk lean between CP and HSP using quantitative gait analysis. Using data from the Gait Analysis laboratory at Shriners Hospital for Children (Shrine), one cohort of patients was developed for cerebral palsy with spastic diplegia and another for HSP. Additionally, these groups were further subdivided based on GMFCS level (Global Motor Function Classification Score). Analysis was only performed on GMFCS Level 2 and 2 patients. Beyond this level, patients either utilize an assistive device for ambulation (Level 3 & 4), thus minimizing lateral trunk lean, or do not ambulate (Level 5). Magnitude of lateral trunk lean was documented in each patient, and the two groups were compared to each other, using T-Tests with statistically significant p-value at 0.05. Looking at all subjects, there was no statistically significant difference ($p=0.158$), though there was a trend toward HSP patients using more lateral trunk lean. Separating the GMFCS Level 2 patients, there was a difference that very nearly reached statistical significance ($p=0.056$) with the same trend. Therefore, HSP patients may very well utilize more lateral trunk lean than in CP. Further studies may include a larger sample size. Additionally, it may be beneficial to track lateral trunk lean by age.

Key Words:

Hereditary Spastic Paraparesis, Quantitative Gait Analysis, Lateral Trunk Lean

PM&R RESIDENT PRESENTATION

Athletics after Spinal Cord Injury - Impact on Daily Living

Presenter:

Silke Bernert, M.D.

Collaborators:

Judith Petty, Margaret Peavy, Julie Duncan, Linda Clark, Ronnetta Williams, Sara Salles, D.O.

Departmental Affiliations:

University of Kentucky, Department of Physical Medicine and Rehabilitation
Cardinal Hill Rehabilitation Hospital, Lexington, Kentucky

Abstract Text:

Quality of Life is highly dependent on Activities and Community Participation. Participation in Athletics improves Quality of Life. Do they change the perception of effort for ADLs for the Spinal Cord Injured and does that also play a role in the overall improvement of Quality of Life?- Methods: Comparison of People after SCI who participate in athletics versus those who do not in how they perceive the degree of effort for Activities of Daily Living. This will be combined with measures of overall Quality of Life, including mood, self-efficacy and Depression. Athletes will be matched with Non-Athletes by age, gender and level of Injury. It is anticipated, that athletics after Spinal Cord Injury decrease perceived effort with ADLs, increase community participation, decrease depression, increase self-efficacy and improve overall Quality of Life.

Key Words:

Quality of Life, Spinal Cord Injury, Athletics, Activities of Daily Living

PM&R RESIDENT PRESENTATION

Cognitive and Functional Improvement in a Pediatric Patient with Acute Disseminated Encephalomyelitis Following Methylphenidate Treatment: A Case Report

Presenter:

Jessica L. Colyer, M.D.

Collaborators:

Chad A. Walters, D.O.

Departmental Affiliations:

University of Kentucky Medical Center, Department of Physical Medicine and Rehabilitation
Shriner's Hospital for Children, Lexington, Kentucky

Abstract Text:

Methylphenidate (MPH) is a mild central nervous system (CNS) stimulant that is thought to activate the brain stem arousal system and cortex by acting on various catecholaminergic receptors. The use of MPH is indicated by the FDA for the treatment of attention deficit disorder and narcolepsy. MPH has also been used off-label for decades for the treatment of cognitive dysfunction in traumatic brain injury in both the adult and pediatric population. MPH use in other neurological conditions in children has been controversial. Here, we report on a four-year-old girl who suffered from acute disseminated encephalomyelitis (ADEM). ADEM is an immune-mediated CNS inflammatory condition that presents as an acute encephalopathy with multifocal neurologic signs and deficits. Residual effects from the disease process in this patient included flaccid limbs and generalized weakness with total dependence required for many activities of daily living (ADLs), cognitive slowing with decreased verbalization and play, and lethargy. Prior to the administration of MPH, the patient remained lethargic and made poor functional gains during an acute inpatient rehabilitation stay. Within 24 hours of the initiation and titration of MPH, the patient's condition markedly improved, including increased alertness and ability to communicate, increased age-appropriate play, and improved performance of ADLs. Implications and future research are discussed.

Key Words:

Acute disseminated Encephalomyelitis; Pediatric Rehabilitation; Case Report; Methylphenidate

PM&R RESIDENT PRESENTATION

Palliative Intrathecal Baclofen Therapy (ITB) for Upper Extremity Spasms in a Patient with Amyotrophic Lateral Sclerosis: A Case Report

Presenter:

Oscar O. Ortiz-Vargas, M.D.

Collaborators:

Sara S. Salles, D.O.

Departmental Affiliations:

University of Kentucky Medical Center, Department of Physical Medicine and Rehabilitation

Abstract Text:

Patients or Programs: A 42-year-old Right handed woman with tetraparesis and spasticity secondary to Amyotrophic lateral sclerosis (ALS).

Program Description: A patient with diagnosis of ALS presented with spasticity, intermittently moderately painful and at times non-painful spasms in upper more than lower extremities (6/10), as well as associated secondary sleep disturbance. Modified Ashworth Score (MAS) on initial presentation was 2 in left upper and lower limbs, and 1+ in right upper and lower limbs. Penn Spasm Frequency score was 3 (1 to 2 spasms per hour). Tizanidine was helpful with spasticity and pain control but the patient did not tolerate it due to side effects, specifically drowsiness and lower extremity muscle weakness that affected her mobility. She was tried on oral Baclofen but was found to have significant nausea. After a successful continuous ITB trial, using a catheter at the T2 level, a Baclofen pump was implanted and patient was started on ITB.

Setting: PM&R Clinic/Rehabilitation Hospital.

Results: After the intrathecal Baclofen trial, patient reported no side effects and a Penn Spasm Score of 2. MAS was 1 throughout all extremities and manual motor strength examination was unchanged. At the time of pump implantation, she was started on ITB at 48 mcg/day with gradual titration to 90 mcg/day over a four week period of time. At one-month follow up, she showed complete resolution of the sleep disturbance, significant decrease of spasms (Penn Spasm Score of 1), decrease of pain (2/10) and no adverse side effects, including muscle weakness.

Conclusions: Oral antispasmodic agents might be ineffective or unsuitable to control spasticity in all patients with ALS due to its systemic side effects. In similar scenarios, ITB should be considered in the treatment of spasticity in patients with ALS, even in those with non-painful spasms. ITB can provide better control of spasticity with less systemic side effects. In addition, the possibility to place the intrathecal catheter at different levels in the spine makes it possible to selectively treat predominant upper extremity symptoms without causing significant lower extremity weakness.

KEYWORDS:

Amyotrophic Lateral Sclerosis, Muscle spasticity, Spasms, Rehabilitation.

OTHER PRESENTATIONS

The Berg Balance Scale Score Significantly Improves in Those Who Receive Outpatient Physical Therapy Care for Stroke at Cardinal Hill Rehabilitation Hospital

Presenter:

Patrick O. McKeon, PhD, ATC, CSCS¹

Collaborators:

Lynn English, PT, MEd, DPT¹; Leslie Simpson, PT¹. Lisa Tudor, MBA²; Beth Hunter, PhD²

Departmental Affiliations:

¹Department of Rehabilitation Sciences, University of Kentucky, Lexington, KY

²Cardinal Hill Rehabilitation Hospital

Abstract Text:

The Berg Balance Scale (BBS) Score has been used to capture improvements in postural control and function associated with physical therapy outpatient (OP) care after stroke. The purpose of this chart review was to determine whether the BBS score improved in clients who received outpatient physical therapy care at Cardinal Hill Rehabilitation Hospital after stroke. Inclusion criteria consisted of 1) client with diagnosis of stroke who received physical therapy at Cardinal Hill in 2007, 2) a BBS score at initial examination and at discharge. Fifty-one charts were reviewed. Of these, 20 charts fulfilled the inclusion criteria. The BBS score was expressed as a percentage of the total 56 possible points. A paired t-test was used for statistical comparisons; alpha was set a priori as $p < 0.05$. A measure of effect size ((Mean Discharge BBS score – Mean Initial BBS score)/Initial BBS score Standard Deviation) and 95% confidence intervals (CI) around the effect were calculated to describe the BBS change. Effect sizes were interpreted as $< .4$ = weak, $.4$ -. 7 = moderate, and $> .7$ = strong. There was a significant improvement in the BBS scores from initial examination to discharge (Initial BBS score: $70\% \pm 20$, Discharge BBS score: $84\% \pm 19$, $p < 0.001$). This yielded a strong effect (0.71, CI: 0.63 to 0.79). The change in the BBS indicates a meaningful clinical change associated with improvements in postural control and function. Future research is recommended to determine how improvements in the BBS scores are related to quality of life, instrumented postural control measures, and measures of sensorimotor recovery.

Key Words:

Postural Control, Neurological, Rehabilitation, Outcome Measures

OTHER PRESENTATIONS

Common Focus Common Language: Integrating a Transdisciplinary Approach with the ICF into a Winning Combination in Rehabilitation

Presenter:

Camille Skubik-Peplaski, M.S., OTR/L, BCP

Collaborators:

Lisa Tudor, MBA, BBA, B.A. and Beth Hunter, Ph.D.

Departmental Affiliations:

Cardinal Hill Rehabilitation Hospital, Lexington, Kentucky
University of Kentucky, Health Sciences Department

Abstract Text:

The purpose of this paper is to describe how a rehabilitation hospital enhanced their client-centered culture by implementing an ICF integrated computer system with a transdisciplinary model of care. Methods include a transdisciplinary team being created that centered around the client, with the client leading the rehabilitation team. The ICF concepts and language were introduced to allow for a common language, to move toward a wellness model and, to be able to track functional outcomes. A qualitative study revealed the initial experience and perceptions of the employees of the facility while the integrated process was being put into place. The results indicate a renewed sense of team and ability to interact with the clients. The team felt that the client and their family participated more in their care, often directing it, supporting a holistic client-centered model. Improved team communication, was reported, leading to increased functional gains over a shorter hospitalization. The role of the nurse and psychologist were enhanced in this new process and team members moved out of their silos and incorporated new nontraditional intervention techniques.

In conclusion improved teamwork and communication lead to improved client outcomes with this new rehabilitation approach of care. Providing a common language, the ICF and a transdisciplinary team focus, facilitated a more client-centered practice.

Key Words:

ICF, Transdisciplinary, Client-Centered, Change

OTHER PRESENTATIONS

The Fencing Response as an Indicator of Traumatic Brain Injury Severity

Presenter:

Jonathan Lifshitz, Ph.D.

Collaborators:

Ario H. Hosseini and Amanda Lisembee

Departmental Affiliations:

Spinal Cord & Brain Injury Research Center, Department of Anatomy & Neurobiology, Department of Physical Medicine & Rehabilitation, University of Kentucky College of Medicine

Abstract Text:

Traumatic brain injury (TBI) is heterogeneous, both in its induction and ensuing neurological sequelae. In this way, medical care depends on accurately identifying injury severity. Clinically, injury severity is determined by a combination of the Glasgow coma scale, length of unconsciousness and post-traumatic amnesia. In the laboratory, injury severity is gauged by the biomechanical forces and the acute suppression of multiple neurological reflexes. The goal of this abstract is to describe and validate additional criterion that could improve the ability to accurately indicate injury severity.

Anecdotally, a fencing response has been observed in sports injuries at the moment of impact, where extension and flexion of opposite arms occurs despite body position or gravity. Using YouTube®, the internet video database, videos were screened for head injury resulting in unconsciousness. Of the 26 videos identified by an impact to the head and period of unconsciousness, 61.5% showed a fencing response at the moment of impact, regardless of the side of impact. Similarly, adult, male rats subject to central fluid percussion injury demonstrate a comparable fencing response upon injury at moderate (1.9 atm, 42 of 46 animals), but not mild (1.1 atm, 0 of 19 animals), severity. The lateral vestibular nucleus likely mediates the fencing response (tonic neck), where its proximity to the cerebellar peduncles predicts axonal pathology from injury-related forces.

Therefore, the fencing response could indicate neurological impairment associated with more severe TBI and assist in guiding medical care post-injury.

Supported by: UK College of Medicine, NIH NINDS P30 NS051220.

Key Words:

Traumatic Brain Injury, Injury Severity, Rodent, Acute Assessment

OTHER PRESENTATIONS

Designing an Effective Approach to Rehabilitation: Applying the International Classification of Functioning (ICF)

Presenter:

Lisa Tudor, MBA, BBA, B.A. and Camille Skubik-Peplaski, M.S., OTR/L, BCP

Collaborators:

Jon Craft

Departmental Affiliations:

Cardinal Hill Rehabilitation Hospital, Lexington, Kentucky
University of Kentucky, Health Sciences Department

Abstract Text:

Over two years ago Cardinal Hill Rehabilitation Hospital applied a transdisciplinary model of care to the traumatic brain injury program (Model A). During this time key outcomes for functioning were maintained during a clients hospitalization while reducing length of stay by 5 days. However over time changes in staffing shifted this model and its effectiveness decreased. Last year, a new more evolved transdisciplinary approach was applied with the addition of the ICF which provides a coding infrastructure and an ability to track outcomes(Model B). This new model uses a common purpose and language to address the client's goals and the staff focus's on weekly progress, goals and barriers. Functional outcomes were tracked during the implementation of Model B and comparisons will be made to Model A in regards to length of stay efficiency and Functional Independence Measure gains. Outcomes of specific interventions and their effect on dressing, eating and bathing will be presented. In addition, a client satisfaction survey is given to every client post discharge and these results will be shared. Results indicate that the length of stay efficiency for clients with lower initial FIM scores was improved during Model B. Also, the client's goals were consistently addressed by the team with an increase in client satisfaction being noted at discharge.

Key Words:

ICF, Transdisciplinary, Client-Centered

OTHER PRESENTATIONS

The Usefulness of Activity Limitation Following Canalith Repositioning for Benign Positional Vertigo.

Presenter:

Rachel Gleason PT, M.S. and Laura Carter, PT

Collaborators:

Rachel Gleason PT, M.S. and Laura Carter, PT

Departmental Affiliations:

University of Kentucky, Division of Physical Therapy (RG, LC)

Cardinal Hill Health Systems, Outpatient Physical Therapy Department (LC)

Abstract Text:

The purpose of the study is to investigate the effect of activity limitation after canalith repositioning procedure (CRP) on recurrence of benign positional vertigo (BPPV) and on the number CRPs needed to alleviate symptoms: and to quantify postural instability associated with BPPV. Patients diagnosed with posterior canal BPPV will be recruited from the outpatient PT department of Cardinal Hill Hospital. Potential subjects will be identified and recruited during their initial PT visit. Following confirmation of BPPV via PT examination, subjects will receive CRP, standard treatment for BPPV. Subjects will be randomly assigned into two groups: Group 1 – activity limitation and Group 2 – no activity limitation. Following CRP, Group 1 will be instructed in specific activity limitation and Group 2 will be instructed to continue with their normal daily activities. Subjects will be re-assessed within 5 days. For those who present with a positive Hallpike-Dix, a second CRP will be performed. Re-assessment will occur again within 5 days. A third CRP will be administered as appropriate. Following a 3rd CRP, subjects will be instructed to limit activity. Once subjects demonstrate a negative Hallpike-Dix and are discharged from PT, they will be followed by a monthly phone interview to monitor for recurrence of BPPV. Number of treatments necessary to alleviate symptoms and rate of BPPV recurrence will be examined. Comparisons between the two groups will be performed using the Chi-square test and analysis of variance. Postural instability assessments will be calculated and results will be compared to previous findings for this population.

Key Words:

BPPV, Vertigo, Hallpike-Dix, Canalith Repositioning, Postural Instability

OTHER PRESENTATIONS

Establishing a Collaborative Team to Investigate: Health and Quality of Life Related Challenges for Individuals with Spinal Cord Injury, Living in Medically Underserved Areas of Kentucky

Presenter:

Patrick H. Kitzman Ph.D., MSPT¹ and Elizabeth Hunter Ph.D., MSOT²

Collaborators:

- 1) Thomas Kelly, Ph.D., Director of the University of Kentucky Center for Clinical Translational Science Training, Education, and Mentoring (TEAM) group. Dr. Kelly and his group will provide training to our community based collaborators on the importance of community-based research and how to be an active participant in the research endeavor.
- 2) Geanie Umberger, Ph.D., MSPH, RPh., Director of the University of Kentucky Center for Clinical Translational Science Information and Resource Administration (IRA). Dr. Umberger's group will be involved with assisting the Community-based collaborative research group in developing the research initiatives that will be submitted to the NIH and NIDRR.
- 3) Kevin Pearce, M.D., Director of the Kentucky Ambulatory Network (KANS), which is a network of community-based family practitioners. Collaboration with the KANS will be important for directing research needs and for disseminating research findings into community practice.
- 4) David Gross, Director for Research, Marketing, and Community Engagement at the University of Kentucky Center for Excellence in Rural Health. Mr. Gross will be involved with the community outreach aspect of the proposed research.
- 5) Beth Bowling, Research and Engagement for Advancing Community Health coordinator at the University of Kentucky Center for Excellence in Rural Health. Both Ms Bowling and Mr. Gross will be important for establishing the community outreach that will be essential for establishing the community-based research group.
- 6) Francis Feltner, MSN, RN, Director of the Kentucky Homeplace Program. The Homeplace program is intimately involved with providing access to medical, social and environmental services for citizens of the Commonwealth. This program will play a crucial role in establishing the bridge between the researchers and the individuals with disabilities living in rural Kentucky.

Departmental Affiliations:

¹Department of Rehabilitation Sciences, College of Health Sciences, University of Kentucky

²Cardinal Hill Rehabilitation Hospital, Lexington, Kentucky

(Continued) ~ Establishing a Collaborative Team to Investigate: Health and Quality of Life Related Challenges for Individuals with Spinal Cord Injury, Living in Medically Underserved Areas of Kentucky

Abstract Text: Secondary complications following spinal cord injury (SCI) significantly impact the individual's quality of life by limiting functional abilities and participation in desired roles and activities. There continues to be a significant need for research to develop new strategies for the prevention of secondary complications following SCI. Rehabilitation providers have noted that people with disabilities in rural areas are at greater risk of secondary complications. In order to provide the best care for individuals living in rural communities a better understanding of the needs and barriers of individuals with SCI and their families living in rural communities as well as the needs and barriers of health care professionals practicing in the rural communities is required. In the proposed study, two specific aims will be executed that will examine this problem. Specific aim 1, multiple qualitative approaches will be used to examine the health and quality of life related supports and challenges to individuals with SCI in medically underserved rural communities as well as the barriers for the health care providers that treat these individuals. Specific aim 2 a collaborative research team of researchers, rehabilitation specialists, community-based health care practitioners, individuals with SCI, and their families will be established that will identify, develop, and disseminate information and strategies to improve outcomes and quality of life of individuals with SCI living in medically underserved rural communities. The collection of preliminary data and establishing the community-based research team will be used to direct future research questions and grant proposals to NICHD and NIDRR.

Key Words:

Community-Based, Secondary Complications, Rural Communities

POSTER PRESENTATIONS

Presenter:

Poster Presentation:

Anshu Chen, Post-Doc

Comprehensive Differential Proteomic Analysis of Acute Contusive Spinal Cord Injury in Rats

Heather Foozer

Histological and Behavioral Effects of Calpastatin Overexpression after Traumatic Brain Injury in Transgenic Mice

Manan Jhaveri

Humidity and Asthma: Is There an Association?

Sindhu Kizhakke Madathil

Transient induction of Insulin-Like Growth Factor 1/ Insulin-Like Growth Factor 1 Receptor Signaling in the Mouse Brain Following Traumatic Brain Injury

Lumy Sawaki, M.D., Ph.D.

Motor Map Plasticity in Subacute and Chronic Patients Receiving Constraint Induced Therapy After Stroke

Radhika A. Vaishnav, Ph.D.

Cominatorial Strategy for the Treatment of Acute Spinal Cord Injury

POSTER PRESENTATION

Comprehensive Differential Proteomic Analysis of Acute Contusive Spinal Cord Injury in Rats

Presenter:

Anshu Chen, Ph.D.

Collaborators:

Shixin Sun², RangaswamyRao Ravikumar, Ph.D.¹; and Joe E. Springer, Ph.D.¹

Department Affiliations:

¹University of Kentucky Medical Center, Department of Physical Medicine & Rehabilitation

¹University of Kentucky Medical Center, Department of Anatomy & Neurobiology

¹University of Kentucky, Spinal Cord and Brain Injury Research Center (SCoBIRC)

²Applied Biosystems, Framingham, Massachusetts 01701

Abstract Text:

Traumatic injury to the spinal cord initiates a host of pathophysiological events that are secondary to the initial insult leading to neuronal dysfunction and death; yet, the molecular mechanisms underlying its dysfunction are poorly understood. Furthermore, while use of imaging methods may help define injury severity and location, they do not elucidate biological mechanisms of SCI progression. The lack of comparable biomarkers for monitoring SCI makes accurate diagnosis and evaluation of SCI progression difficult. Spinal cord contusion is an extensively used SCI model in rats that best represents the etiology of SCI in humans. In this study, both gel-based and gel-free proteomic approaches were used to investigate injury-related differences in the proteome of rat spinal cord tissue. Rats received a spinal cord contusion at thoracic segment 10 (T₁₀), and the lesion epicenter was dissected at 24 h post-injury. Injury-related differential proteins were analyzed by both two-dimensional (2D) gel electrophoresis coupled with mass spectrometry and differential tagging with isotopic reagents iTRAQ followed by multidimensional liquid chromatography and tandem mass spectrometry proteomic approaches. A list of differential proteins involving in energy metabolism, signaling pathways, protein degradation, inflammatory response, stress response, DNA damage, neuronal functions and blood-spinal cord barrier disruption were identified. This injury-induced differential regulation of spinal cord tissue proteins reveals potential avenues of investigation into the molecular mechanisms of acute SCI and provides several biomarker candidates to evaluate different pathophysiological aspects of SCI.

Key Words:

Spinal Cord Injury, Contusion, Proteome, Liquid Chromatography, 2D Gel Electrophoresis

POSTER PRESENTATION

Histological and Behavioral Effects of Calpastatin Overexpression after Traumatic Brain Injury in Transgenic Mice

Presenter:

Heather N. Foozer, B.S.

Collaborators:

Jennifer M. Pleasant, Kathleen M. Schoch, and Kathryn E. Saatman

Departmental Affiliations:

University of Kentucky Medical Center, Spinal Cord & Brain Injury Research Center (SCoBIRC)
University of Kentucky Medical Center, Department of Physiology

Abstract Text:

Despite neuronal expression of calpastatin, a specific inhibitor of calpains, traumatic brain injury induces sustained activation of these calcium-activated proteases, contributing to neuronal death with subsequent motor and cognitive dysfunction. We hypothesized that increasing neuronal calpastatin levels would improve outcome after brain injury. In our first study, transgenic (TG) mice with neuronal expression of human calpastatin (hCAST) and wildtype (WT) littermates received controlled cortical impact (CCI) brain injury of 0.5 or 1.0mm depth (n=8-9 injured, 3 sham per genotype). Calpastatin overexpression attenuated motor impairment at 24 h after either moderate or severe CCI ($p < 0.005$). In a preliminary analysis (n=5/group), cortical tissue damage in WT and hCAST TG mice was quantified as $9.5 \pm 1.1\%$ (mean \pm SEM) and $6.2 \pm 4.0\%$, respectively, for 0.5mm CCI and $19.9 \pm 1.7\%$ and $16.7 \pm 2.9\%$, respectively, for 1.0mm CCI. No overt differences in MAP-2 immunostaining patterns were observed between hCAST and WT mice. In our second study designed to evaluate longer term functional outcome, mice were subjected to 1.0mm CCI brain injury. At 48 h postinjury, memory retention in a visuospatial task was slightly improved in brain-injured hCAST TG (n=14) compared to WT (n=15) mice ($p=0.2$). Brain injury resulted in significant motor deficits at 2 and 4 ($p < 0.0005$), but not 8, days postinjury. There were no genotype-dependent differences in motor function. Cortical tissue damage assessed at 8 days in a subset of mice was $5.3 \pm 2.7\%$ for WT and $7.4 \pm 1.1\%$ for hCAST TG mice. These data suggest that overexpression of calpastatin was most effective in attenuating early posttraumatic motor dysfunction.

Key Words:

Traumatic Brain Injury, Behavior, Histology

POSTER PRESENTATION

Humidity and Asthma: Is There An Association?

Presenter:

Manan Jhaveri, B.B.S., M.P.H.¹

Collaborators:

James Temprano, M.D.², Hayes Don, M.D.³, Adam Branscum, Ph.D.¹, David Mannino, M.D.⁴

Departmental Affiliations:

1. University of Kentucky, College of Public Health;
2. University of Kentucky, Department of Allergy and Immunology
3. University of Kentucky, Department of Pediatric Pulmonology
4. University of Kentucky, Department of Pulmonary and Critical Care

Abstract Text:

Background: Among factors exacerbating asthma, climate has received little attention. Allergens are found in higher concentrations in humid environments. However, limited knowledge is available whether humidity itself exacerbates asthma.

Objective: To determine whether humidity is an exacerbating factor for asthma and whether its association differs by asthma severity.

Methods: Retrospective chart review of 205 patients seen in the Allergy and Immunology Clinic between August, 2005 and December, 2007 was done. Patients were divided into two groups: asthma with allergic rhinitis (cases, n=126) and allergic rhinitis alone (control, n=79). Data was collected on demographic variables, humidity history, medications used, allergic sensitivity to molds and house-dust mite and spirometry results in both groups. Severity of asthma is categorized on basis of medications used (Mild: Nasal steroids and Bronchodilators, Severe: Inhaled steroids and Leukotriene antagonists). Odds ratios and their corresponding 95% confidence intervals were estimated using conditional logistic regression with adjustment for other variables.

Results: Among the 126 cases, 70% reported humidity as an exacerbating factor for asthma compared with only 39% of controls ($p < 0.0001$). Multiple logistic regression analysis showed that cases were more likely to report humidity as an exacerbating factor independent of stratification by allergic sensitivity to molds and house-dust mite ($p = 0.3326$). Asthma patients reported humidity as an exacerbating factor irrespective of their severity ($p = 0.9559$).

Conclusion: Our findings suggest that humidity is an exacerbating factor for asthma controlling for molds and house dust mite and asthma severity.

Key Words:

Asthma, Humidity, Molds, Epidemiology

POSTER PRESENTATION

Transient Induction of Insulin-Like Growth Factor 1/ Insulin-Like Growth Factor 1 Receptor Signaling in the Mouse Brain Following Traumatic Brain Injury

Presenter:

Sindhu Kizhakke Madathil, Ph.D.

Collaborators:

Heather Foozer, B.S., Kathryn Saatman, Ph.D.

Departmental Affiliations:

University of Kentucky, Spinal Cord and Brain Injury Research Center (SCoBIRC)

University of Kentucky, Department of Physiology

Abstract Text:

Insulin-like growth factor 1 (IGF-1) is a polypeptide protein hormone similar in molecular structure to insulin. IGF-1 has been shown to be a potent neurotrophic factor that promotes cell survival, synaptogenesis, dendritic arborisation and myelination. Exogenous IGF-1 has been shown to be neuroprotective in cerebral ischemia, and we previously demonstrated improved behavioral function in brain-injured rats treated with recombinant human IGF-1. While IGF-1 mRNA increases 3 days after experimental traumatic brain injury (TBI), no information is available regarding protein levels. In the current study we investigated the changes in levels of IGF-1 and IGF-1 receptor (IGF-1R) following controlled cortical impact (CCI) brain injury of 0.5mm depth. We also studied the effect of injury on levels of total and phosphorylated Akt, a known downstream mediator of IGF-1 signaling. The induction of these IGF system components were measured by using ELISA, immunohistochemistry or western blotting at different time points (1, 6, 24, 48 and 72hr) following CCI brain injury or sham injury (n=6 injured and 2 sham per time point). We observed a transient upregulation of IGF-1 levels in the injured cortex 1hr after injury ($p=0.01$). In contrast, no significant change in IGF-1R was observed across the time points studied using immunoblotting of cortical homogenates. Interestingly, 72hr following CCI injury, IGF-1R immunostaining revealed increased expression in the blood vessels bordering the impact zone. Although total Akt levels were unchanged in cortical homogenates, serine phosphorylated Akt increased transiently at 6hr post injury. Our findings indicate that moderate TBI results in a brief induction of IGF-1 and its signaling components in the acute posttraumatic period. Supplementation of this short-lasting increase in expression by exogenous administration of IGF-1 may have therapeutic benefits.

Key Words:

Traumatic Brain Injury, Insulin-like growth factor 1, Controlled Cortical Impact, Phosphorylated Akt

POSTER PRESENTATION

Motor Map Plasticity in Subacute and Chronic Patients Receiving Constraint Induced Therapy after Stroke

Presenter:

Lumy Sawaki, M.D., Ph.D.

Collaborators:

Andrew J. Butler, PhD, MPT^{3,4}; Xiaoyan Leng MD, PhD¹; Peter A. Wassenaar, MS^{5,6}; Yousef Mohammad, MD⁷; Sarah Blanton, DPT, NCS³; K. Sathian, MD, PhD^{3,4,8}; Deborah S. Nichols-Larsen, PhD, PT⁵; Steven L. Wolf, PhD, PT, FAPTA^{3,4}; David C. Good, MD^{1,9}; and George F. Wittenberg, MD, PhD^{1,10}

Departmental Affiliations:

- 1 Wake Forest University, Department of Neurology, Program in Rehabilitation, Winston Salem, NC
- 2 University of Kentucky, Department of Physical Medicine and Rehabilitation, Lexington, KY
- 3 Emory University, School of Medicine, Department of Rehabilitation Medicine, Atlanta, GA
- 4 Atlanta VAMC Rehabilitation R&D Center of Excellence in Rehabilitation of Aging Veterans with Vision Loss, Decatur, GA
- 5 The Ohio State University, School of Allied Medical Professions, Columbus, OH
- 6 The Ohio State University, Department of Radiology, Columbus, OH
- 7 The Ohio State University, Department of Neurology, Columbus, OH
- 8 Emory University, School of Medicine, Department of Neurology, Atlanta, GA
- 9 Penn State Milton S. Hershey Medical Center, Department of Neurology, Hershey, PA
- 10 VAMHCS, Geriatrics Research, Education, and Clinical Center, and University of Maryland, Department of Neurology, Baltimore, MD

Abstract Text:

Constraint Induced Movement Therapy (CIMT) has received considerable attention as a promising intervention to enhance upper extremity motor recovery after stroke. Several studies have shown favorable results of CIMT either in the subacute or chronic phase post-stroke. However, direct comparison of the degree of cortical reorganization in subacute and chronic patients receiving CIMT has not been performed and was the purpose of this multicenter study. We hypothesized that a higher degree of cortical reorganization would occur in subacute patients. **METHODS:** 17 subacute (less than 9 months post-stroke) and 9 chronic (more than 12 months post-stroke) were recruited. Each subject was evaluated using transcranial magnetic stimulation (TMS) and Wolf Motor Function Test at baseline, after 2 weeks and at a 4-month follow-up. Both groups received CIMT for 2 weeks immediately after baseline. TMS was used to stimulate motor cortical projections to the extensor digitorum communis muscle and measure the motor map, recruitment curve and silent period. **RESULTS:** The subacute experimental group showed greater improvement compared to the chronic experimental group on time-based measures of WMFT immediately after CIMT ($p=0.024$) but improvement did not differ at 4-month follow-up. TMS motor maps showed long-lasting enlargement in both subacute and chronic experimental groups. The map center of gravity, an accurate measure of map location, shifted posteriorly in the chronic, but not subacute group. There were no significant differences between groups in recruitment curves or silent periods. **CONCLUSION:** CIMT appears to be effective in both the subacute and chronic phase after stroke. Enlargement of TMS motor maps appears to be a consistent component of CIMT-dependent plasticity, as it occurs in both subacute and chronic periods. Chronic stroke patients may be more susceptible than subacute patients to relocation of the hand motor representation in motor cortex.

Key Words:

Neuroplasticity, Motor, Recovery, Cortical, Transcranial Magnetic Stimulation

POSTER PRESENTATION

Combinatorial Strategy for the Treatment of Acute Spinal Cord Injury

Presenter:

Radhika A. Vaishnav, Ph.D.(1)

Collaborators:

Yiqin Xiong (1,2), Edward D. Hall, Ph.D. (1,2,3,4)

Departmental Affiliations:

- (1) University of Kentucky, Spinal Cord and Brain Injury Research Center (SCoBIRC)
- (2) University of Kentucky, Department of Anatomy and Neurobiology,
- (3) University of Kentucky, Department of Neurology and
- (4) University of Kentucky, Department of Neurosurgery

Abstract Text:

Spinal cord injury (SCI) is a devastating condition that affects active individuals of all ages for whom treatment options remain inadequate. Therapeutic interventions targeting reactive oxygen species (ROS)-mediated damage or calpain-mediated neurodegeneration at short time points following acute SCI are partially neuroprotective. To achieve greater protective effects following SCI, it would be advantageous to combine these individual therapeutic approaches. The primary objective of this research plan is to systematically block post-traumatic neurodegeneration following SCI by scavenging ROS and inhibiting calpain-mediated proteolytic degradation of the neuronal cytoskeleton. The rat PSI T10 spinal cord contusion injury model will be used for this study. Shams, injured rats with vehicle, and injured rats treated with critically selected doses of the drugs alone or in combination will be compared at specific time points following injury. Calpain-mediated cytoskeletal breakdown will be assessed at short time-points post-SCI using an immunochemical spectrin breakdown assay. Functional and locomotor recovery along with assessment of tissue sparing will be compared among the various treatment and control groups at 42 days following SCI. Oxidative damage to lipids and proteins will be assessed using qualitative and quantitative assays including immunohistochemistry and immunoblotting. Preliminary studies evaluating potential antioxidants and calpain inhibitors for use in this combinatorial study are currently in progress. The findings of this study will provide a foundation for the design of future translational studies in human SCI.

Support: NIH-NIDA 1T32 DA 022738-01 (EDH/RAV) and KSCHIRT Grant #6-5 (EDH).

Key Words:

Oxidative Stress, Spinal Cord Injury, Neurodegeneration, Translational Neuroscience

PHYSICAL MEDICINE & REHABILITATION RESEARCH DAY 2008

The Department of Physical Medicine & Rehabilitation would like to acknowledge our appreciation to those who have made the 20th Annual Research Day a success.

CARDINAL HILL REHABILITATION HOSPITAL

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