



University of Kentucky
Department of
Physical Medicine & Rehabilitation

12th Annual
Research Day

June 8, 2000

University of Kentucky
Department of Physical Medicine & Rehabilitation
Research Day Agenda

Lexington VAMC Auditorium

8 June, 2000

08:45 – 08:50 am Opening Remarks: David Gater, MD, Ph.D.

Resident Research Presentations

08:55 – 09:10 am Gay Richardson, MD
09:15 – 09:30 am Danzhu Guo, MD
09:35 – 09:50 am Scott Akers, MD
09:55 – 10:10 am Sara Salles, D.O.
10:15 – 10:30 am Jackson Maddux, MD
10:35 – 10:50 am Melanie Ledford, MD
10:55 – 11:10 am Carmela Osborne, MD
11:15 – 11:30 am Lauren Larson, MD
11:35 – 11:50 am Gay Richardson, MD
12:00 – 12:30 pm Lunch Buffet

Featured Speaker

12:30 – 1:30 pm **“Development of Pushrim Activated Power Assist
Wheelchairs”**

Rory A. Cooper, Ph.D.
Professor, Chairman & Director, Human Engineering Research Lab
School of Health & Rehabilitation Sciences
University of Pittsburgh
Center of Excellence for Wheelchair & Related Technology
VA Rehabilitation Research & Development Service
U.S. Department of Veterans Affairs

1:30 – 2:15 pm Faculty Poster Presentations: Discussion

2:15 – 2:30 pm Awards and Closing Remarks: David Gater, MD, Ph.D.

PM & R Resident Abstracts 2000

The Effect of Aerobic Exercise on Endurance and Community Mobility in Spinal Cord Injured Adults.

Presenter: Gay A. Richardson, MD

Collaborators: Jody L. Clasey, Ph.D.; J.W. Yates, Ph.D.; David R. Gater, MD, Ph.D.

Problem: Roughly 25% of relatively young patients with paraplegia demonstrate aerobic capacity that is barely sufficient to meet the demands of independent living, and their ability to sustain independence as they age is questionable. The purpose of this investigation was to improve endurance and community mobility in SCI adults. **Hypothesis:** After 10 weeks of exercise utilizing an arm crank ergometer, there would be a significant increase in the distance achieved around a standardized track and decreased time required to maneuver a standardized ramp when compared to pretest values. **Aim:** To determine if the regimen of exercise used in this study is sufficient to increase community mobility and provide greater efficiency when performing daily activities. **Methods:** 5 individuals with motor complete C7-T4 SCI, after initially serving as their own controls, underwent timed ramp and wheelchair push. Testing was performed at the beginning and end of a 3-month period in which individuals maintained their routine level of activity. Once this baseline was established, subjects performed 30 minutes of monitored aerobic activity 3 times weekly for 10 weeks. Performance measures were then repeated and compared to pretest values. **Results:** After completing 10 weeks of prescribed aerobic exercise, subjects improved the distance achieved during a 12-minute push around the standardized track by an average of 25.8% (+/- 16.8%) and improved the time needed to maneuver the standardized 50-foot ramp by 11.5% (+/-28.8). A high standard deviation in the results of the ramp test was due to shoulder soreness in one of the subjects on the final day of testing. **Relevance:** Due to the significant physiologic changes found after SCI, safe and beneficial exercise parameters such as those outlined in this study must be established in order to standardize exercise protocols in SCI centers around the country. *Key Words: Spinal Cord Injury, Exercise, Community Mobility, Performance Measures*

Noninvasive Pulsed Radiofrequency Therapy for Carpal Tunnel Syndrome (Plan)

Presenter: Danzhu Guo, MD.

Collaborators: Robert Nickerson, MD. Janet Walker, MD. etc.

Problems: Carpal Tunnel Syndrome (CTS) has an incidence of 0.1% in the general population. Causation has been well established with certain occupations. The 500,000 cases annually account for \$2 billion in health resources. The purpose of this pilot investigation is to determine the efficacy of pulse radiofrequency magnetic fields (PRMF) treatment in the recovery of function and reduction of pain and swelling associated with CTS. **Hypothesis:** The pathology of CTS arises when edematous flexor tenosynovitis compresses the median nerve at the carpal tunnel causing focal demyelination. PRMF has been used primarily for reduction of edema and pain in chronic skin ulceration. By reducing swelling and edema, PRMF will reduce the tissue pressure within the carpal tunnel, resulting in decompression of the median nerve within the carpal tunnel. **Aim:** The primary objective of the pilot investigation is to use a pre-set standard treatment regimen to yield significant improvement in an experimental group comparing it to a placebo group. **Methods:** 100 volunteers, who meet our CTS diagnostic criteria will be recruited, and will be placed in a random, prospective, double blind experimental design. Outcomes will be measured by a functional assessment of motor and sensory function. The Levine self-assessment questionnaire will be filled out on three occasions: prior to, immediately after, and one month following the last treatment. Eight patients have completed study so far. **Relevance:** Researchers still believe that more effective and less invasive therapeutic approaches to this problem are necessary. The use of noninvasive, nonthermal pulsed radiofrequency therapy to reduce disability, pain and swelling in mild and moderate CTS is proposed. *Key Words: Carpal Tunnel Syndrome, Pulse Radiofrequency Magnetic Field.*

PM & R Resident Abstracts 2000 (Continued)

A Comparison of Functional Outcome of Synvisc® Versus Celestone® Injections in the Treatment of Patients with Osteoarthritis of the Knee: A Randomized Double Blinded Prospective Study.

Presenter: Scott R. Akers, M.D.

Collaborators: Gerald V. Klim, D.O. & Paul V. Brooks, M.D.

Objective- To compare functional outcomes in patients with severe osteoarthritis of the knee after treatment with intra-articular Celestone® versus intra-articular injection of Synvisc®. **Design-** Randomized, double blinded, prospective study. Clinical observer and patient will be blinded to the treatment received. **Intervention-** A course of treatment will consist of three intra-articular injections of Synvisc® or one injection of Celestone® followed by arthrocenteses at one week intervals in the target knee. **Setting-** Outpatient university musculoskeletal physiatry practice. **Participants-** As yet undetermined number of adult patients referred to an outpatient university based musculoskeletal physiatric practice. Patients must be ambulatory (assistive devices allowed), diagnosed with OA of the target knee of at least three months duration according to the American college of Rheumatology (ACR) criteria, pain from OA requiring frequent use of analgesics or NSAIDs for at least 3 months before enrollment, and any acute disease or trauma leading to secondary OA of the target knee must have occurred at least five years before study entry. All patients must be capable of understanding, signing and dating an informed consent form. **Outcome measures-** Primary measurement instrument will be the patients Functional Independence Measure score as outlined by the Uniform Data System for Medical Rehabilitation, which will be assessed by a licensed physical therapist before entering the study and then again at twelve weeks. Patients will also be required to complete the SF-36 Health Survey prior to the first injection and again at their twelve week follow up.
Results: To follow.

Basal Metabolic Rate, Body Composition and Functional Measures for Adults With Multiple Sclerosis Versus Healthy Adults

Presenter: Sara S. Salles, D.O.

Collaborators: Jody L. Clasey, Ph.D. & David R. Gater, M.D., Ph.D.

Introduction: Few patients with Relapsing Remitting Multiple Sclerosis (RRMS) or Chronic Progressive Multiple Sclerosis (CPMS) participate in sustained physical activity. These individuals are at increased risk of obesity with associated heart disease, glucose intolerance, and reduced aerobic fitness. In addition, obesity and reduced aerobic capacity significantly impacts the ability to perform activities of daily living (ADLs) and community mobility in this population. **Hypotheses:** 1) Basal Metabolic Rate (BMR), Glucose metabolism and lipid profiles are significantly altered in those individuals with Multiple Sclerosis (MS). 2) Traditional methods for determining body composition will introduce significant error in persons with MS when compared to the current gold standard of a 4-compartment model. 3) Kurtzke EDSS values are inversely related to fat mass, BMR and HDL cholesterol but directly related to the percent of body fat, total and LDL cholesterol and glucose intolerance in persons with MS. 4) Functional Independence Measures (FIM) values are directly related to fat-free mass, BMR and HDL cholesterol but inversely related to percent body fat, total and LDL cholesterol, and glucose intolerance. **Aim:** The objectives of this pilot investigation are to quantify the physiologic and functional changes noted in patients with MS. **Methods:** Twenty volunteers will be recruited. Subjects will participate in hydrostatic and total body water weighing, anthropometry, BMR testing, DXA scan, glucose tolerance, and a neurological examination. FIM and EDSS will be assigned to all subjects. **Relevance:** Metabolic Rate, body composition, and functional parameters used to assess individuals with MS require strict methodology in order to accurately assess interventional modalities. *Key Words: Multiple Sclerosis, Body Composition, Basal Metabolic Rate, Glucose Tolerance, FIM, EDSS*

PM & R Resident Abstracts 2000 (Continued)

Motor Firing Patterns of Scapulohumeral Rhythm

Presenter: Jackson Maddux, M.D.

Collaborators: Tim Uhl, Ph.D. P.T. A.T.,C.; Brian Zeller, MS, A.T.,C.; W. Ben Kibler, M.D.; Paul V. Brooks, M.D.

Problem: Scapular dysfunction is commonly present in association with glenohumeral pathology. One role of the scapula is to provide a movable base to maintain glenohumeral joint integrity and provide optimal length for function of the rotator cuff musculature. Loss of motor control of scapular rotators hampers rehabilitation of glenohumeral pathologies. **Purpose:** To determine if there are muscle firing pattern abnormalities of the scapular musculature in those individuals with glenohumeral pathology and abnormal scapulohumeral rhythm, as compared to normal subjects. **Subjects:** Ages: 21-52 (normal subjects); 21-49 (abnormal subjects). Subjects with no history of shoulder pathology and demonstrate full range of motion in their shoulder are classified as normal subjects. Projected number is 15 in this group, presently have 7. Subjects with a clinical diagnosis of rotator cuff impingement, glenoid labral tear, or acromioclavicular sprain that present with abnormal scapulohumeral rhythm are classified as abnormal scapulohumeral rhythm. Projected number in this group is 15, presently have 6. Subjects are excluded from this study if they had a previous fracture in the shoulder girdle, adhesive capsulitis, or previous surgery to either shoulder. Subjects are also excluded if they had bilateral symptoms of shoulder pain. **Methods:** All subjects are asked questions regarding their history of shoulder injuries and shoulder dominance. The subjects are asked to move their arms through a complete range of motion to assure that they meet the inclusion criteria. The subjects stand with their back and to each side in front of a video camera with arms at their side for 10 seconds. The subjects are instructed to lift their arms above their head as far as they were able in two planes of motion, the frontal and 45° anterior to the frontal plane. This was repeated three times in each plane. Subjects elevate and lower their arms at a constant rate of 45°/sec. The subjects are instrumented with bipolar surface electrodes placed over their upper trapezius, lower trapezius, and serratus anterior bilaterally. Electrical goniometers are aligned with midline of the humerus and the thorax to monitor dynamic shoulder range of motion. Subjects perform maximal voluntary isometric contractions for each muscle group using a standard manual muscle test position. The subjects perform bilateral arm elevation and lowering in the exact same manner as described above. The kinematic data from the electrical goniometer and electromyographic data is analyzed over 20° intervals throughout elevation and lowering. **Results:** Results and Conclusions are forthcoming. The information gained from this study will hopefully increase our understanding of abnormal scapulohumeral rhythm and its relationship to glenohumeral pathologies. It is hoped that this method will provide a dynamic electromyographical assessment of scapular and rotator cuff musculature to document progression through rehabilitation.

Efficacy And Tolerance of Megace as an Appetite Stimulant in Patients with Amyotrophic Lateral Sclerosis

Presenter: Melanie Hines Ledford, M.D.

Collaborators: Dr. Edward J. Kasarskis, University of Kentucky Department of Neurology

Problem: Decreased appetite and nutritional intake are present in the majority of patients with amyotrophic lateral sclerosis (ALS). Depression and increased time required to complete a meal could explain this in part, but is there a metabolic component also? Megace (megestrol acetate) has been studied in cancer and AIDS but not in ALS. **Aim:** We plan to do a pilot study to look at the efficacy and tolerance of Megace on increasing appetite and weight in ALS. **Methods:** The set-up of the study is in progress. We will select a group of ALS patients having decreased appetite. Weight, level of appetite by a qualitative instrument, body mass/compensation, muscle power (gait lab), fasting blood amino acids and leptin, and depression by a qualitative instrument will be assessed before the start of treatment and at intervals thereafter. **Key Words:** *Amyotrophic, Lateral Sclerosis, Megace, Appetite, Nutrition*

PM & R Resident Abstracts 2000 (Continued)

Vocational Outcomes Following Spinal Cord Injury

Presenter: Carmela G. Osborne, MD

Collaborators: David R. Gater, Jr., MD, PH.D., David Musick, Ph.D.

Problem: Following Spinal Cord Injury (SCI), results of studies evaluating return to work have been varied. Estimates of employment range from 16-59%, but are generally accepted to be less than 50%. **Hypothesis** 1) The rate of return to work in this region following SCI is less than the generally accepted percentage determined by the Model Systems SCI database, and 2) The involvement of individuals with Vocational Rehabilitation leads to better return to work rates than in those who do not participate. **Aim:** To determine demographics, pre- and post-injury employment rates, financial disincentives and patient involvement with Vocational Rehabilitation in the SCI database of Cardinal Hill Rehabilitation Hospital (CHRH). **Methods:** A questionnaire was developed and sent by mail to all individuals listed in the CHRH SCI database. Non-responders were contacted to complete the survey by telephone. **Results:** To date, 44% of individuals receiving the questionnaire have responded. Evaluation of responders reveals the education level of 32% to be less than high school, 43% high school/GED graduates, and 25% who completed college/post graduate education. . Following SCI, 27% of responders stated they were employed, 45% unemployed, 18% students, and 9% as retired. 45% were offered Vocational Rehabilitation, with 45% of these participating. 21% stated participation helped them in finding employment. 53% stated they would lose benefits by returning to work. **Relevance:** Determination of the factors involved in poor return to work rates following SCI in this region will help health care and Vocational Rehabilitation providers structure programs that address and meet the needs of these individuals. *Key Words: Spinal Cord Injury, Vocational Outcomes, Employment*

Comparison of a Once Daily Dopamine Agonist Versus the Currently Marketed Immediate Release Dopamine Agonist for the Treatment of Parkinson's Disease

Presenter: Lauren Larson, M.D.

Problem: The growth in research focusing on the treatment of Parkinson's Disease (PD) in recent years has resulted in the development of many new medications. New non-ergoline dopamine agonists (DA), such as ropinirole, have been developed due to the problems of motor complications induced with long term levodopa therapy. Ropinirole has been extensively studied and has proven to be an effective monotherapy choice in early PD. **Aim:** The objective of this study is to select the maximum well-tolerated dose that will provide at least an equivalent tolerance to the currently used ropinirole. **Methods:** The study is a randomized, multi-center, double-blind, active controlled, escalating dose study. The patients selected will be randomized to receive the immediate release drug three times per day or sustained release once per day medication for seven days. The patients may be of either gender, between the ages of 30 to 75 years of age, and with a diagnosis of idiopathic PD in its early stages. The patients will be admitted for 12 hours after receiving the medication to monitor blood pressure, pulse, bloodwork, urinalysis, adverse events, phosphokinase, and an EPWORTH sleep scale will be completed.

PM & R Resident Abstracts 2000 (Continued)

The Effects of Surgical Correction of Equinus Deformity in Children with Cerebral Palsy

Presenter: Gay A. Richardson, M.D.

Collaborators: Brian T. Carney, M.D., Donna Oeffinger, M.S.

Problem: Cerebral Palsy (CP) is a disorder resulting from a non-progressive central nervous system insult that often leads to abnormalities in muscle posture and tone. In children with CP, abnormality of tone combined with abnormal growth at the musculotendinous junction frequently leads to progressive equinus deformity at the ankle. **Hypothesis:** After surgical correction of equinus deformity at the ankle, patients with CP will have an increased gait velocity, increased passive ankle dorsiflexion (ADF), and no postoperative loss of function as classified by the Gross Motor Functional Measure (GMFM) and the Gross Motor Functional Classification System (GMFCS). **Aim:** To determine if surgical lengthening of the gastrocnemius muscle or triceps surae tendon will result in improved motor function, less use of adaptive equipment, and improved temporal-spatial parameters on gait analysis. **Methods:** Twenty-five ambulatory patients who had previously been diagnosed with either spastic diplegia or hemiplegia were included in this retrospective analysis. All patients had undergone pre- and postoperative gait analysis, including a goniometric physical exam for range-of-motion performed by the laboratory physical therapists. Gait studies were performed both barefoot and with the patient's individual adaptive equipment (including ankle foot orthoses, walkers, and crutches). Nineteen patients had also completed pre- and postoperative GMFM and GMFCS evaluations. **Results:** After surgical correction of equinus deformity, there was a significant decrease in postoperative barefoot gait velocity ($p < 0.0091$) and increase in ADF ($p < 0.0001$). Two patients (8%) no longer used their AFO's, while four (16%) who had no preoperative assistive devices were braced postoperatively. In terms of motor function, 2 patients (11%) advanced from a GMFM level 2 to a Level 1. Average GMFCS category D scores decreased postoperatively by 4.7% while category E scores decreased by 1.5%. Neither decrease was found to be a significant change ($p = 0.16$ and $p = 0.49$ respectively). **Relevance:** With the significant number of children who eventually undergo surgical correction of equinus deformity of the ankle, functional outcomes need to be well established. This study revealed that even though patients experience a decrease in postoperative gait velocity, motor function is not significantly affected. For many patients, the reported benefits of less weight-bearing on the metatarsal heads, improved shoe wear, decreased toe-walking, and decreased pain and callosity outweigh the surgical risks involved. Additionally, this study revealed that correction of the deformity will not necessarily reduce the need for adaptive equipment such as AFO's. **Key Words:** *cerebral palsy, gross motor functional analysis, gross motor functional classification system, gait analysis.*

PM & R Faculty Posters 2000

Improved Control of Posture and Movement using Functional Neuromuscular Stimulation

Presenter: James J. Abbas, PhD

Collaborators: JoAnne Riess, MS, Jason Gillette, PhD, Pankaj Kataria, MS
Xia Zhang, MS, Eric Hartman, and Junli Ou.

Problem: Functional neuromuscular stimulation (FNS) systems have been developed to provide individuals with thoracic level spinal cord injury with the ability to stand and step. Due to several limitations, however, these efforts have not yet led to widespread clinical use of electrical stimulation systems. One important limitation is that the systems rely heavily on upper extremity support and therefore provide limited functional capability. A second limitation is that stimulation values must be custom fit for each user in a process that is time-consuming and often ineffective. **Objectives:** For control of posture and movement using FNS, we seek to develop systems that 1) effectively utilize the intrinsic properties of muscle, 2) automatically adjust stimulation parameters to account for individual muscle characteristics and fatigue, and 3) provide the user with the ability to make preparatory adjustments prior to performing a task. **Methods:** Computer-based models have been used to study the effects of muscle properties on posture control and to develop new control strategies. We have designed adaptive control systems to automatically fit the needs of a particular individual. Experiments on able-bodied subjects have been used to investigate the effect of foot-placement on posture control and experiments on subjects with spinal cord injury have been used to evaluate adaptive control algorithms. **Results and Conclusions:** The simulation studies and the experimental studies have indicated that the adaptive control system can provide improved control of posture and movement, and they have demonstrated that muscle properties may be exploited to provide assistance in stabilizing posture. Experiments on able-bodied subjects have suggested that the ability to adjust foot placement may be a useful feature of an FNS posture control strategy. Future work will integrate the adaptive control strategies and the preparatory adjustment strategy in a system that may result in an enhanced ability to perform functions while standing. *Key Words: Spinal Cord Injury, Functional Neuromuscular Stimulation, Standing, Adaptive Control.*

Relationship Between Glucose Intolerance and Body Composition in Spinal Cord Injury

Presenter: David R. Gater, Jr., MD, Ph.D.

Collaborators: Jody L. Clasey, Ph.D. and J.W. Yates, Ph.D.

Problem: Spinal cord injuries (SCI) predispose to glucose intolerance and insulin resistance, presumably due to changes in body composition and skeletal muscle dysfunction, placing SCI individuals at greater risk for diabetic retinopathy, nephropathy, gastropathy, neuropathy and coronary artery disease. In the able-bodied, marked improvements in glucose tolerance have been reported in response to both aerobic and resistance exercise, with variable changes in insulin sensitivity. These changes have been associated with body composition changes in the able bodied. **Purpose:** The purpose of this pilot investigation was to determine the relationship between glucose tolerance and body composition in SCI Adults. **Hypothesis** Glucose intolerance is directly related to % Body Fat (%BF) in SCI adults, and inversely related to Fat-free Body Mass (FFM). **Aim:** The primary objective of this pilot investigation was to assess oral glucose tolerance in persons with C7-L2 Motor Complete SCI and to determine its relationship with body composition. **Methods:** Twenty persons (14 men, 6 women) with C7-L2 Motor Complete SCI were admitted overnight to the U of Kentucky GCRC. 3-hour Oral Glucose Tolerance Tests were performed from 0800-1100 after an 8-hour fast, with glucose and insulin levels determined at rest and 30-minute intervals. Body composition was assessed in each individual by 4-Compartment modeling using hydrodensitometry, DXA scan, and Bioelectrical Impedance Analysis. **Results:** Mean Glucose Area Under the Curve (AUC) for SCI was significantly elevated in C7-T5 (965 ± 102 mg%•min) and T6-L2 SCI (723 ± 52) compared to AB* (679 ± 18 mg%•min), and significantly different from each other ($p < 0.05$). Further, Glucose AUC was significantly correlated ($r = 0.671$, $p < 0.001$) with %BF in those persons with SCI. **Relevance:** The strong relationship between glucose intolerance and body composition implies that reducing %BF in persons with SCI may improve glucose intolerance. *Key Words: Spinal Cord Injury, Glucose Tolerance, Body Composition*

PM & R Faculty Posters 2000

Body Density Determination by Hydrostatic Weighing and Air Displacement Plethysmography in Spinal Cord Injured Adults

Presenter: Jody L. Clasey, Ph.D.

Collaborators: David R. Gater, Jr., MD, Ph.D., BA Rogers, CB Mize

Problem: Spinal cord injury (SCI) often causes rapid and potentially reversible changes to one or more of the components of the fat-free body (FFB). The use of multi-compartment models, which often require an accurate measure of total body density (D_b), are necessary to provide a more accurate measure of body composition in SCI individuals. Traditionally, D_b is determined by hydrostatic weighing (HW) which can be difficult and labor-intensive for both SCI individuals and investigators. Recently, air displacement plethysmography (ADP) has been proposed as an alternative technique for D_b determination and the relative ease of this technique would be desirable for measurements in SCI populations. **Aim:** The purpose of this study was to compare measures of body volume (V_b ADP) and body density (D_b ADP) obtained by ADP (Bod Pod; Life Measurement Instruments, Inc.) with measures of body volume (V_b HW) and body density D_b HW obtained by HW in 9 motor complete SCI (T4-L2) adults (6 men, 3 women). **Methods:** Each subject completed both ADP and HW with residual volume during a single testing session. Paired t-tests were used to compare V_b ADP to V_b HW and D_b ADP to D_b HW. Regression analysis and total error (TE) were used to assess the strengths of these relationships. Group mean comparisons ($x \pm SE$) showed that V_b ADP (75.70 ± 10.11 L) and D_b ADP (1.0223 ± 0.0101 g/cc) were not significantly different ($p < 0.05$) from V_b HW (75.41 ± 10.01 L) and D_b HW (1.0252 ± 0.0081). Significant correlations were found for the V_b ($r = 1.00$) and D_b ($r = 0.90$). TE for V_b and D_b were ± 0.77 L and 0.0133 g/cc, respectively. **Results:** These data suggest that ADP may provide a valid alternative method to determine body density for use in multi-compartment modeling in SCI populations. It should be noted that two additional SCI subjects (C6-C7) were tested but the thoracic gas volumes (TGV) measure required in ADP were not possible due to loss of use of intercostal muscle resulting from their high level of spinal cord damage (above T2). In the lower SCI subjects, predicted TGV was (3.84 ± 0.50 L) compared to a measured TGV of (3.35 ± 0.50 L) ($p = 0.063$). Further investigation is warranted to determine the usefulness of predicted TGV measures in SCI populations. *Key Words: Spinal Cord Injury, Body Composition*

Evaluating Residents' Clinical Skills & Professionalism via the PM&R "Mini-CEX"

Presenter: David W. Musick, Ph.D.

Collaborators: Susan M. McDowell, M.D.

Problem: Residency program standards require multiple methods for evaluating resident physicians' clinical skills, with emphasis on "real time" observation of residents by teaching faculty during patient care. **Methods:** This pilot study assessed the usefulness of a new PM&R "Mini-Clinical Evaluation Exercise" (CEX) instrument. The "Mini-CEX" form was modeled after a method used in internal medicine programs (1). Using a nine point rating scale, eleven faculty members evaluated trainees' clinical skills over three academic years. The instrument was used in seven inpatient and three outpatient rotations. Eight ratings items were completed per resident, based on observation by faculty of focused physical examinations. **Results:** Descriptive statistics (mean, mode, variance, percentages) were computed and analyzed. Average ratings were higher for females (7.48) than for males (6.50), and were higher for outpatient settings (7.14) than for inpatient (6.92). Highest rated items were "humanistic qualities and professionalism" and "physical examination" skills. Lowest rated were "clinical diagnostic" and "patient management" skills. Faculty satisfaction with the instrument was high (7.25). **Relevance:** The PM&R Mini-CEX shows promise for use in PM&R residency programs, as it offers an easy to use format for evaluating residents' clinical skills and professionalism. Further testing of the instrument across multiple training programs should be a priority for our specialty. *Key Words: Clinical Skills Evaluation; Graduate Medical Education*

PM & R Faculty Posters 2000

Error In Assessing Body Composition In Spinal Cord Injured Individuals Using Traditional Methodologies

Presenter: Jody L. Clasey, Ph.D.

Collaborators: David R. Gater, Jr., MD, Ph.D., CB Mize, JM Purcell, JW Yates, Ph.D.

Problem: Traditional research and field methods of assessing body composition have often been generated and cross-validated using healthy able-bodied individuals. These methods assume that the proportions and densities of the primary constituents of the fat-free body (FFB; mineral, protein and water) are known, additive and stable over time. Spinal cord injury results in significant changes to one or more of these FFB components and thus introduces an undetermined amount of error to body composition estimates. **Aim and Methods:** The purpose of this study was to determine the validity of total body percentage fat estimates from dual-energy x-ray absorptiometry (DXA %Fat), hydrodensitometry (UWW %Fat; Siri, 1956), bioelectrical impedance analysis (BIA %Fat), and anthropometry (J&P %Fat; Jackson and Pollock 1978 & 1980) against a criterion 4-compartment body composition model (4-Comp %Fat; Heymsfield et al, 1990) in 15 (9 men and 6 women) motor complete spinal cord injured (C7-L2) adults (age: 38.6±14.8 yrs). Repeated measures ANOVA, regression analyses and calculation of total error (TE) were used to determine the error in assessing %Fat using traditional body composition methodologies.

4-Comp %Fat	32.0 ± 2.5	19.7 – 58.6			
DXA %Fat	34.1 ± 3.0	18.3 – 63.1		0.92 [#]	4.9
UWW %Fat	31.3 ± 3.4	4.8 – 57.0		0.82 [#]	7.3
BIA %Fat	27.3 ± 2.6*	14.3 – 57.1	0.78 [#]	8.0	
J&P %Fat	14.1 ± 1.7 [#]	5.8 – 26.3		0.76 [#]	18.9

*p < 0.02 vs 4-Comp %Fat #p < 0.001 vs 4-Comp %Fat TE = Total Error

Results: All traditional methods of estimating %Fat were significantly correlated with 4-Comp %Fat measurements and the small mean differences suggest that the estimates provide valid measures of %Fat. However, the large TE demonstrated that substantial individual variability exists when estimating body composition using these methods. Thus, until regression based equations specifically generated from SCI adults are available, use of these methods should be avoided to report baseline %Fat or the effect of treatment or intervention on body composition. *Key Words: Spinal Cord Injury, Body Composition*