



**A01**

**HOW CAN WE HELP OUR PATIENTS SEARCH THE INTERNET?**

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**Objective:** With the myriad of websites on the internet, how do physiatrists guide their patients in educational searches of health information?

**Methods:** A systematic search of internet websites through the Google search engine was conducted until saturation (repetition) of sites was achieved. A sampling of diagnoses was chosen: brain injury, muscular dystrophy, poliomyelitis, and amputation. Sites were rated according to level of evidence and reading level.

**Results:** Saturation of sites was obtained, in most cases, at around 220 to 300. Most sites were written at a level requiring Grade 12 reading comprehension, and were of average quality with respect to level of evidence. Literacy of the general population is discussed.

**Conclusion:** Physicians need to be prepared to provide appropriate guidance to their patients who use the internet to educate themselves about their health conditions. This might be in the provision of keywords and guidelines, or individual website addresses.



A02

## THE USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE IN ADULT CEREBRAL PALSY

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**Background:** Previous studies have not investigated complementary and alternative medicine (CAM) in adult cerebral palsy (CP).

**Hypothesis:** To qualitatively analyze the use of CAM by adult cerebral palsy.

**Methods:** Ten adult (over 18 years) cerebral palsy individuals participated in semi-structured interviews. Participants were asked open-ended questions related to demographics, use of conventional medicine, and complementary therapies. A Framework Analysis approach was used to interpret field data and generate themes.

**Results:** Seven of ten participants had utilized at least one type of CAM previously. The most commonly used complementary therapies were aquatherapy, message therapy, hippotherapy and chiropractic manipulation. CAM was used to supplement successes achieved through traditional treatments, and fill gaps in the service provision of physiotherapy and occupational therapy.

### Conclusions:

1. A majority of adult CP patients in this study either use CAM or request information about CAM
2. There exists a need to validate the use of CAM in adult CP
3. Barriers to use of CAM include physician knowledge and acceptance, costs, awareness, accessibility to services, and need for supports.

**Mesh headings:** complementary therapies; cerebral palsy; rehabilitation



**A03**

**SEX AND YOUNG ADULTS WITH SPINA BIFIDA: WHAT ARE THE ISSUES?**

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**Background:** Adult spina bifida has limited sexual knowledge compared to their non-disabled peers. The most frequent resource is the school with parents as distant second choice.

**Hypothesis:** To determine the effect of the educational environment on the desire of adults spina bifida to know more about sex.

**Methods:** Ten adults with spina bifida, aged 18-36 were recruited. The Sexual Knowledge Interview Schedule (SKIS) was used to assess general knowledge. Both quantitative and qualitative analysis of data was done.

**Results:** Five female and five male spina bifida interviewed. Attendance at high school for the physical disabled did not increase sexual knowledge. There was no male/female difference in comprehension of sexual education. Three themes emerging from qualitative analysis:

1. Unable to formulate a question about sex & spina bifida
2. Difficulties in sexual relationship
3. Concerns about having children

**Conclusions:**

1. 70% participants want more sex education
2. School environment & parents did not provide adequate sex education
3. Young adults unclear how to ask questions about sex
4. Physicians need training about sex & disability

**Mesh headings:** spina bifida; sex; education



**A04**

**METHADONE IN THE TREATMENT OF SPINAL CORD INJURY PAIN. REVIEW OF A SERIES OF THREE PATIENTS**

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**Objective:** Our objective was to study the effectiveness of methadone in treatment of SCI pain.

**Methods:** In a case series we reviewed the charts and interviewed three patients with SCI that were started on methadone after failing multiple other pain medication interventions. Response to methadone was measured with a numerical pain scale from 0 (no pain) to 10 (worst pain possible). Data on doses and side effects were also collected.

**Results:** Our patient group consisted of two males and one female of  $54 \pm 7$  years old. The diagnoses were as follows: complete C4 tetraplegia, complete T10 paraplegia and complete T3 paraplegia. Two patients exhibited neuropathic pain both below and at the same level as the spinal cord injury. One patient reported below-level neuropathic pain. Mean duration of pain was  $7 \pm 4$  years. Patients reported failed trials with 7, 5, and 4 previous analgesics respectively. Before starting methadone, mean average, mean maximal and mean minimal pain intensity was  $6.7 \pm 2$ ,  $9 \pm 1.4$  and  $5 \pm 2.1$  respectively. After the dose of methadone was stabilized, mean average, mean maximal and mean minimal pain intensity was  $3.7 \pm 1.7$ ,  $5.7 \pm 1.9$  and  $2.7 \pm 1.7$  respectively representing a reduction from the base line of 3, 3.3 and 2.3 respectively. Two patients reported improvement in function. Average methadone dose was  $43 \pm 40$  mg/day. Side effects were tolerable and temporary in nature.

**Conclusions:** In this small case series Methadone appeared to be an effective and safe treatment for patients with SCI related pain. RCTs are needed to further evaluate the effectiveness of methadone in SCI pain.



**A06**

**WHEELING À PETIT PAS: A CASE REPORT OF PARKINSONISM DETECTED BY OBSERVATION OF WHEELCHAIR PROPULSION**

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We present the case of a man undergoing inpatient prosthetic rehabilitation for a transfemoral amputation. His manual wheelchair (MWC) propulsion technique was observed by our physiotherapist to include rapid, brief, low-power strokes, resembling the marche à petit pas phenomenon of Parkinsonism.

We videotaped his MWC skills, documenting his velocity, cadence and mechanical efficiency. Compared to 10 age-, gender-, and diagnosis-matched controls, our patient's rolling velocity was only 22%, the cadence was 348% faster and the mechanical efficiency was 5%. He required 76 strokes to cover 1 m whereas the controls spanned this distance in 2 to 6 strokes.

The initial observation led to a shift in his rehabilitation goals from a manual to a power wheelchair as the primary means of mobility. Appropriate physical examination, neurologic consultation and investigation confirmed a diagnosis of Parkinsonism. He underwent a trial of levodopa/carbidopa without significant clinical or functional improvement.

This is the first report of how Parkinsonian features may affect manual wheelchair propulsion. This case report suggests that the evaluation of wheelchair mobility, in conjunction with gait assessment, should be a routine component of the functionally-oriented physical examination of wheelchair users.

This case report has been submitted for publication to *The Archives of Physical Medicine & Rehabilitation* in January 2005.



A07

**FROM SPACE TO CLINICAL REALITY: TRANSCRANIAL ELECTRICAL STIMULATION AND AMELIORATION OF ORTHOSTATIC HYPOTENSION IN ANIMALS EXPOSED TO SIMULATED MICROGRAVITY**

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**Rational:** Orthostatic hypotension (OH) is a commonly observed phenomenon after exposure to microgravity, in autonomic failure, after spinal cord injury and as a result of aging. Although numerous mechanisms could contribute to the OH, it was suggested that a decrease of descending sympathoexcitatory activation from the supraspinal structures could be responsible for this condition.

**Methods:** We examined the effect of transcranial electrical stimulation (TES) on OH in animals induced by exposure to microgravity using a hindlimb unloading model. Twenty male Wistar rats were tail suspended with the angle between cage floor and rat's body of approximately 40°. Swivel apparatus allowed animal to move freely in the cage, to consume food and water. NASA originally developed this model as a land based model to study the effects of space flight as it mimics most of the physiological alterations that occur during prolonged space flight or bed rest. Ten age-matched Wistar rats were used as cage control. The orthostatic instability was examined by using an orthostatic challenge test (45° head up test for a period of 3 min). TES was applied during the orthostatic challenge test in experimental group but not in control.

**Results:** The orthostatic challenge test in animals exposed to microgravity caused a significant decrease in arterial blood pressure by 18.4±2.2%. However, activation of the central autonomic structures via TES prominently attenuated microgravity-induced orthostatic hypotension. In this group of rats blood pressure drop during orthostasis comprised only 9.5±1.8% (p<0.05) and was not significantly different from corresponding value in cage control group (6.9 ± 1.1%).

**Conclusion:** Results of this study showed that TES sufficiently reduce the changes in blood pressure during orthostatic challenge test in animals exposed to microgravity. Future clinical experimental study will be directed on examination of effects of TES on OH in volunteers after prolonged bed rest, in individuals with spinal cord injury, and in astronauts.



A08

## EARLY INTERVENTION IN MILD BRAIN INJURY: ONE-YEAR EXPERIENCE OF URBAN REHABILITATION CENTER

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**Rationale:** Recent studies indicate that early intervention following mild brain injury (MBI) such as education; reassurance and support for guided resumption of activities significantly reduce social morbidity and severity of post-concussion symptoms. Although, numerous risk factors for prolongation of symptoms following MBI were identified, it is still difficult to identify individuals with MBI who will require rehabilitation interventions.

**Methods:** •Inclusion criteria: individuals who experienced a traumatically induced physiological disruption of brain function with at least one of the following features: loss of consciousness for less than 10 minutes, any loss of memory for events immediately before or after the trauma, alteration in mental state at the time of injury, and/or focal neurological deficits. Clients were screened and those at risk of developing persisting post-concussion symptoms were provided with strategies for gradual resumption of activities and follow-up to monitor their recovery and evaluate their rehab needs.

**Results:** A total of 430 individuals with MBI were referred to the Early Response Brain Injury Service during a one-year period. All individuals were contacted and information on MBI was provided. Twenty of the individuals (5%) continued to experience persisting post-concussion symptoms and required referral to a physiatrist. There was equal distribution of male and female in this group. Average age was 37, ranging from 19 to 58 y.o. Motor vehicle accidents (35%) hit head on object (25%) and assault (15%) were the predominant causes of MBI. Majority of these individuals suffered from headaches (95%), sleep disturbances (95%), fatigue (90%), decrease concentration and attention (89%), and dizziness (80%). The majority of individuals presented with evolving depression and anxiety (89%), indicated demanding responsibilities (80%) or sustained associated orthopedic or soft tissue injury (70%).

**Conclusions:** Similar to previous observations, our data indicated that medical, situational and psychological risk factors could contribute to the persistent symptoms following MBI. However, the number of factors and their combination could vary significantly between individuals.



A09

## RETURN TO WORK FOLLOWING TRAUMATIC WORK RELATED LOWER LIMB AMPUTATION

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**Objective:** To determine the demographic and injury factors predictive of return to work (RTW) and days of total disability (TD) in a population of persons actively working at the time of an injury resulting in lower extremity amputation (LEA).

**Methods:** Retrospective search of a database maintained by the Workers Compensation Board of Alberta from 1995 to 2000. All claims coded as “lower extremity amputation” were retrieved. Data variables were extracted from the master database, and copies of relevant documents were manually reviewed to code levels of amputation.

**Results:** Of 88 valid cases, 48% were toe level amputation, 23% transtibial, 14% partial foot, 14% transfemoral, and 2% high level. 58% of all subjects returned to work, 19% were deemed “fit for work”, and 23% did not return to work. Days TD ranged from 0 to 1664, with a mean of 366 days. Bivariate analysis showed amputation level, life total costs, and days TD as being significantly related to RTW, and rehabilitation costs, vocational rehabilitation, work assessment, age, number of surgical procedures, number of days in acute care, and amputation level as being significantly related to days TD. Surprisingly, even toe level amputation resulted in a mean of 127 days TD. In the multivariate model, only lower amputation level and higher gross annual income showed predictive value for return to work. However older age at time of accident, greater numbers of surgical procedures, less days of acute care stay, and higher amputation levels were all significantly predictive of increased days TD.

**Conclusion:** This study highlights the importance of considering toe amputation levels as having significant potential economic and disability impact on the workplace. Other factors beyond simply amputation level (such as previous income level) are important considerations in the functional outcome of these patients.



**A10**

**DO STUMP AND PHANTOM LIMB PAIN CHANGE OVER TIME?**

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We initiated a prospective study of pain after lower limb amputation. This is the second analysis with more patients. We assessed changes over time in stump and phantom limb pain. Previous studies did not defined how pain after amputation changed over time. The University of Manitoba Human Ethics Committee approved the study. Patients who consented, were interviewed and assessed with standardized questionnaire and pain scale about phantom limb sensation, stump pain and phantom limb pain. The amount of pain was rated on a scale starting at 0 (no pain) to 10 (worse pain imagined). Seventy-nine patients completed the assessments. The patients were grouped into 3 groups based on the time from amputation to date of interview: 1-2 months (median 1) (N=10), 3-8 months (median 6) (N=34) and 9-15 months (median 12) (N=12). The three groups were similar in age, percentage of below knee versus above knee amputations, and pain before amputation. The prevalence of phantom sensations (60%, 77%, 80%) were similar. The prevalence and severities of stump pains were also similar. Phantom limb pains were reported by 70%, 56%, and 57% of the patients in the three groups, the average pain severities were  $3.3 \pm 3.1$ ,  $2.7 \pm 3.1$ , and  $3.4 \pm 3.6$ . The pain sensations were reported for  $15 \pm 12$ ,  $6 \pm 10$ , and  $5 \pm 9$  days per month ( $P < 0.05$ ). The percentages of patients whose sleep were disturbed by the pain sensations were 80%, 18% and 37% ( $P < 0.05$ ). In conclusion, the frequencies of the phantom limb pains and the frequencies of sleep disturbance by pain decreased significantly after the first two months while the prevalence of the stump and phantom limb pain among the patients and average severities of the symptoms did not change significantly.



**A11**

**SKIN PROBLEMS IN AN AMPUTEE CLINIC**

*NL Dudek, MB Marks, SC Marshall*

**Objective:** To document the type and frequency of individual residual limb skin problems among patients using a lower extremity prosthesis including the suggested etiology and management of each type of skin problem.

**Method:** A six-year retrospective chart review of skin lesions diagnosed in patients examined in an outpatient amputee clinic at a regional, referral rehabilitation hospital in Ottawa, Canada. Skin lesions were included if they were on a lower extremity residual limb of a patient who functionally used a prosthesis. Descriptive statistics were used to analyze data.

**Results:** A total of 528 skin problems were documented in 337 lower extremity residual limbs. Ulcers, irritations, inclusion cysts, calluses and verrucous hyperplasia were the five most common skin problems representing 79.5% of all documented skin disorders. The suggested etiologies for these problems were multi-factorial and their management required a variety of treatments.

**Conclusions:** This study demonstrates that a wide variety of dermatological conditions occur frequently in lower extremity amputees who functionally use a prosthesis. Five types of skin problems accounted for nearly 80% of the skin lesions identified. Future studies are required to evaluate prevention and management of the most frequent skin problems.



A12

**QUALITY OF LIFE AND FUNCTIONAL OUTCOME 6 MONTHS AND 1 YEAR POST MILD TRAUMATIC BRAIN INJURY**

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**Background:** Although recovery from mild traumatic brain injury (mTBI) is complete after 6 months for the majority of persons, an estimated 10-20% of mTBI patients will go on to develop post concussion syndrome.

**Hypothesis:** mTBI patients with comprehensive medical insurance presenting to an Emergency Ward will have a higher level of community functioning at 6 months and one year post injury compared to persons without comprehensive insurance coverage.

**Objective:** To compare resumption of social roles for mild traumatic brain injured patients with and without comprehensive private medical insurance.

**Study Design:** Prospective cohort study.

**Setting:** Tertiary Hospital Emergency Department (2 Sites).

**Participants:** Persons age 18-65 who had sustained a mTBI and who had presented to the Emergency Department for evaluation.

**Methods:** Patients were recruited within the first week post injury and then interviewed at 1 month, 6 months and 1 year post injury. Measures included the Community Integration Questionnaire (CIQ), the Neurobehavioral Functioning Inventory (NFI), the Rehabilitation Activities of Daily Living Survey (RADLS), the Short-form 36 (SF36) as well as neuropsychology screening, the PRIMEMD to assess for affective disorders and pain measures.

**Results:** 141 participants of a possible 359 (39%) were recruited who were then evaluated at 1 month, 6 months (n=114) and 12 months (n=77) post injury. At 6 months and 1 year there was no significant difference between insurance groups on measures of quality of life (SF36), functional abilities (RADLS), symptoms (NFI) or community integration (CIQ). However, persons meeting the DSM IV criteria for the diagnosis of post concussional disorder at 1 year post injury, were significantly impaired across all domains including quality of life, symptoms, functioning and community integration compared to those who did not have the diagnosis of post concussional disorder.

**Conclusions:** There is no difference in outcome following mTBI at 6 months or 1 year between patients with and without comprehensive insurance coverage. However, patients who progress to develop post concussional disorder have evidence of poorer quality of life, functional abilities and community integration at 1 year post injury.



**A13**

**PREVALENCE OF THE OBSTRUCTIVE SLEEP APNEA SYNDROME AFTER CERVICAL CORD INJURY**

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**Objective:** To estimate the prevalence of the obstructive sleep apnea syndrome (OSAS) in patients with a cervical cord injury and identify associated factors.

**Methods:** Adults with a complete or incomplete cervical cord injury of >6 months duration and with no prior history of OSAS were recruited from out-patient clinics and invited to participate in the study. Participants completed a medical questionnaire and a physical exam. Data was collected on characteristics of the spinal cord injury, current medication, sleeping habits, degree of daytime sleepiness, measurement of body mass index (BMI) and neck circumference. A standard overnight polysomnography was done for all participants with simultaneous registration of EEG, surface sub-mental EMG, ECG, oro-nasal airflow, oxygen saturation by pulse oximetry, eye movements, respiratory efforts and sound. Diagnostic criteria (American Academy of Sleep Medicine) for OSAS were: 1) 5 or more apneas, hypopneas (with oxygen desaturation of >3 % or arousal) or respiratory effort-related cortical arousals of  $\geq 10$  sec duration/hr of sleep and either: 2) excessive daytime sleepiness (not explained by other factors) or: 3) 2 or more symptoms among cognitive dysfunction, recurrent awakenings or choking during sleep.

**Results:** 40 participants (33 men) with a cervical cord injury level between C4 and C8 completed the study. OSAS was found in 22 patients (55%): OSAS was mild (5-14/hr) in 13, moderate (15-29/hr) in 1 and severe ( $\geq 30$ /hr) in 8. Daytime sleepiness, BMI and neck circumference were associated factors.

**Conclusion:** Prevalence of OSAS is high after cervical cord injury; OSAS should be suspected especially in patients with daytime sleepiness and obesity.



**A14**

**REFERRAL PATTERNS TO A MULTIPLE SCLEROSIS OUTPATIENT REHABILITATION CLINIC**

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**Objective:** To Examine the correlation between reasons for referral made to a multiple sclerosis rehabilitation clinic and the recommendations made by the physiatrist.

**Design:** Retrospective chart review for new consults to a multiple sclerosis rehabilitation clinic from April 1984 until October 2003.

**Main outcome measures:** The correlation between the reasons for referral and the recommendations made by the physiatrist using the Kappa coefficient.

**Results:** I reviewed 558 referral letters. 9.3% of the letters contained non specific questions or were asking for a general rehabilitation assessment. 90.7% of the letters contained specific reasons for referral. Mobility assessment, which was the most common reason for referral and the most common recommendation, showed only moderate agreement between the referring physician and the physiatrist. Even though bladder management was discussed in 28.3% of referrals and was the second most common recommendation made, there was only slight agreement between the referring physician and physiatrist. For the specific referrals, the referring physician requested that 1.6 issues on average to be addressed and received 3.7 recommendations on average from the physiatrist.

**Conclusions:** This study showed a lack of awareness by other specialities regarding role of the physiatrists in the management of patients with multiple sclerosis. We have made suggestions to assists in increasing this awareness.



A15

**ORTHOSTATIC HYPOTENSION DURING ACUTE REHABILITATION OF SPINAL CORD INJURED INDIVIDUALS: FREQUENCY, SEVERITY AND MANAGEMENT.**

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**Rationale:** Orthostatic hypotension (OH) is a common complication experienced by patients with acute spinal cord injuries (SCI). This complication may not only cause substantial discomfort for such individuals, but also can interfere significantly with their medical, nursing and rehabilitative care.

**Methods:** A retrospective chart analysis was conducted on patients who were evaluated during their acute admission by a physiatrist at Vancouver General Hospital. The orthostatic challenge test in which the patients were sat up to 60 degrees was utilized to determine the presence of OH, defined as a drop in the systolic blood pressure of 20 mm Hg or greater.

**Results:** A total of 26 male and 12 female consecutive individuals with spinal cord injuries (mean age of  $43.9 \pm 19$  years) admitted over a one year period were evaluated. Two thirds of the patients had cervical spinal cord injuries; 92% underwent surgical stabilization and decompression. At admission, the severity of neurological injury according to the American Spinal Injury Association (ASIA) scale was: 19 ASIA A, 7 ASIA B, 6 ASIA C, and 6 ASIA D.

During the first month of hospitalization, 537 orthostatic challenge tests were conducted, ranging from 1 to 60 per patient. Within one week of injury, 11 individuals (8 cervical, 3 thoracic) were noted to have OH, but only 8 (6 cervical, 2 thoracic) of them had persistent OH through the end of the first month. For those individuals with OH, the mean decrease in systolic blood pressure during the orthostatic challenge test was  $25 \pm 8.6$  mmHg at one week post injury and  $28 \pm 8.3$  mmHg at one month post injury. Midodrine was initiated in 6 individuals in order to manage OH.

**Conclusions:** Orthostatic hypotension was observed in up to 29% of individuals within the first week after SCI and was more common and more persistent in cervical SCI. The medical care and rehabilitation of individuals with SCI complicated by OH is a medical challenge with profound implications on resource utilization. As such, it should be a priority for further study.

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**A16**

**PHENOL INJECTIONS IN A PHYSIATRY PRACTICE: A RETROSPECTIVE CHART REVIEW**

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**Objective:** To determine the safety and effectiveness of phenol injections in the management of spasticity.

**Methods:** A retrospective chart analysis of 39 patients with focal spasticity referred to a single physiatrist from 2001 to 2004 for phenol motor point injections was conducted.

The inclusion criteria included patients who had follow-up visits with documented post injection outcome measures such as degree of spasticity, assessment of gait and activities of daily living. Twenty-one patients were excluded yielding a final sample of 18 patients.

**Results:** Patient demographics: Male (33%, n=6), Female (67%, n=12). Mean age=43 years. Mean of 3 visits per patient, with an average of 2 months to first follow up.

Underlying pathology: Acquired brain injury (55 %, n=10), multiple sclerosis (28 %, n=5), spinal cord injury (11 %, n=2) and cerebral palsy (6 %, n=1).

Motor point injections:

- An EMG guided method of identification of motor points was used.
- Total volume of phenol injected in divided doses at each visit ranged from 3 -15 cc of 6% phenol.
- In total, 134 muscle groups were injected with 49% being the calf muscles, 20% thigh adductors, 10% medial hamstrings, 8% tibialis posterior, 5% tibialis anterior, 4% biceps/brachioradialis, 4% finger flexors.

Reported side effects:

Muscle scarring 6%, dizziness 2%, pain 2% and swelling 1% of 134 muscle groups injected.

Functional benefits:

Reduction in muscle tone was observed immediately post-injection in 17 patients (94%). At average 2 months 50% of this group had improved gait, 28% improvement in perineal care and 17%, reduction of clonus.

**Conclusions:** There was good functional benefit and low reported side effects following the use of phenol injections for focal spasticity. The stringent inclusion criteria reduced the sample size. Phenol injections were particularly beneficial in patients with severe spasticity of larger muscle groups.



A17

## MEASURES OF EXERCISE INTENSITY IN A COPD EXERCISE REHABILITATION PROGRAM

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**Objective:** To assess the improvement in exercise endurance and the correlation among measures of exercise intensity in COPD patients participating in a pulmonary rehabilitation program.

**Methods:** Thirty-six COPD patients were enrolled in a twelve week cardiovascular exercise program through the Saskatoon Pulmonary Rehabilitation Program. Participants were supervised by a physiotherapist for three 60 minute sessions weekly. Resting levels of dyspnea were recorded using the Modified Borg Scale. Exercise intensity was evaluated by heart rate (HR). Exertional dyspnea (ED) and the overall Rate of Perceived Exertion (RPE) were measured independently using the Modified Borg Scale. Target HR was calculated by the Karvonen formula and was recorded using a pulse oximetry finger monitor.

**Results:** The median resting dyspnea rating was three. There was no correlation between exercise HR and either RPE ( $r = 0.03$ ) or ED ( $r = 0.17$ ). The correlation between RPE and ED was 0.58 ( $p < 0.01$ ). The mean change in HR with exercise was 12 beats/minute. Participants reached a minimum of 40% of their maximum HR 20% of the time. A minimum score of 4/10 was met 12% of the time on the RPE and 52% of the time on the ED ratings. Median RPE was three and median ED was five. Although median RPE ratings remained unchanged, distance walked improved by 45% (mean distance increased by 274 meters, CI = 133- 415,  $p < 0.001$ ). Ratings of ED improved from week one (median 5) to week 12 (median 4,  $p < 0.002$ ).

**Conclusion:** Walking distance improved over a twelve week program. Perceived overall exertion, exertional dyspnea and HR may be measuring different aspects of exercise intensity in COPD. COPD participants in a rehabilitation program achieve significant benefit with low intensity exercise.



**A18**

**PILOT STUDY ON A COMBINED ASSESSMENT USING MAGNETIC RESONANCE SPECTROSCOPY AND MOTOR UNIT NUMBER ESTIMATE IN ALS PATIENTS**

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**Background:** Tools for early diagnosis and disease monitoring in ALS patients are lacking. Magnetic resonance spectroscopy (MRS) and motor unit number estimate (MUNE) are potentially useful biomarkers in quantifying cortical and spinal motoneuronal changes.

**Methods:** Three ALS patients along with 3 control subjects each underwent two examinations separated by 4 months. At each session, each subject had a MUNE study using the multiple point stimulation technique on the median-innervated hand muscles and the EDB muscle and a high field 3 T MRS study of the hand and foot regions of the motor cortex. MRS was used to quantify the neuronal and glial markers NAA/Cr and NAA/mI.

**Results:** At baseline, the MUNE in the ALS patients were already markedly diminished and they declined by  $12\pm 26\%$  in the hand and by  $30\pm 65\%$  in the EDB muscle after 4 months. NAA/Cr was diminished in one ALS patient at baseline. However, there was no consistent change in the spectroscopic indices after 4 months in this small number of subjects.

**Conclusions:** MUNE could discriminate ALS patients from healthy controls and was sensitive to disease progression in 4 months. Some abnormalities were also seen in the MRS studies but the pattern was less consistent. These results illustrate the feasibility of combined longitudinal MUNE and MRS assessment in ALS patients. Larger sample size will be needed to determine the utility of this method to aid in early diagnosis and monitoring of disease progression in ALS.



A19

### AGE AND GENDER SPECIFIC NORMATIVE VALUES FOR THE MOBERG PICK-UP TEST

*K.M. Chan, N. Amirjani, N.L. Ashworth, T Gordon, D Edwards (Edmonton, Alberta)*

**Background:** The Moberg Pick—Up Test is a standardized test to assess hand dexterity but its application is limited by a lack of population norms. The primary goal of this study was to examine the impact of aging and, secondarily, the impact of gender and handedness on the performance of the Moberg Pick—Up Test.

**Methods:** One hundred and sixteen healthy subjects, between 20 and 89 years of age, carried out the Moberg Pick—Up Test. Eighty seven of them were female and 29 were male.

**Results:** The results from each of the four subsets of the test showed that the hand function of the subjects was significantly affected by age, with young subjects being the fastest and the elderly being the slowest. Female subjects accomplished the test faster than male. Although the subjects' performance with the dominant hand was better than with the non-dominant hand, the magnitude of difference was small.

**Conclusions:** The normative values established based on the categories of age and gender provides useful objective criteria against which the hand dexterity of different patient populations can be gauged.



**A20**

**A PILOT STUDY OF THE EFFECTS OF TEGASEROD ON CONSTIPATION IN PATIENTS WITH MULTIPLE SCLEROSIS**

*WM Chrusch, LJ Worobetz, J Biem, R Sankaran*

**Objective:** To evaluate the safety, efficacy and tolerability of tegaserod, a selective serotonin 5-HT(4) receptor partial agonist in Multiple Sclerosis (MS) patients with chronic constipation.

**Design:** open-labeled, cross-over pilot study.

**Setting:** MS outpatient clinic located within a tertiary care center.

**Patients:** 13 patients (mean age 47.7 yrs, range 31-62 yrs, 11 females) with mean duration of MS symptoms of 17.2 yrs and constipation of 7.8 yrs.

**Interventions:** A 4-week baseline assessment was followed by a 4-week assessment during a course of tegaserod 6 mg PO BID.

**Main Outcome Measures:** Change in constipation severity measured using visual analogue scale (VAS) and diary data (stool frequency, consistency, ease of passage); colonic transit time (CTT) using radio-opaque sitzmarker method; quality of life assessment and global evaluation.

**Results:** Compared to baseline, mean change in constipation severity (VAS) improved with tegaserod from 55.1 to 36.1 ( $p=.014$ ). Although CTT improved in 7 patients, this was not statistically significant ( $p=.72$ ). Diary data showed an improvement in average stool frequency from 3.4/wk to 4.4/wk ( $p=.012$ ) with improved stool consistency and ease of passage. Global evaluation was reported as excellent ( $n=5$ ), good ( $n=5$ ) and no change ( $n=3$ ). No significant adverse clinical, laboratory or ECG effects were observed.

**Conclusions:** Tegaserod was well tolerated and resulted in a statistically significant reduction in constipation severity (VAS) and increase in stool frequency. Improved VAS did not always correlate with improved CTT suggesting other factors influencing subjective interpretation. Tegaserod may be of benefit in selected patients with MS and troublesome constipation.

**Key Words:** Multiple Sclerosis, Constipation, Serotonin agonist



**A21**

**DESCRIBING THE HEALTH OF ADOLESCENTS AND ADULTS WITH CHILDHOOD ACQUIRED DISABILITIES.**

*Nancy L. Young PhD, Wendy Mills MSW, Anna McCormick MD, Katherine Boydell PhD, Cathy Steele PhD, Darcy Fehlings MD, Mary Law PhD, Sue Muhkerjee MD, Peter Rumney MD, John Wedge MD.*

**Objective:** Individuals who have cerebral palsy (CP), spina bifida (SB) and pediatric acquired brain injury (ABI) face many health challenges throughout their lives. It is important to understand the long-term health outcomes of these common causes of childhood acquired disability. The purpose of this paper is to describe the health status of adolescents and adults who have CP, SB and ABI.

**Methods:** A pool of 2,367 youth and adults was identified through a review of health records at 6 Children's Rehabilitation Center's in Ontario. Invitations to participate in a survey were mailed to those with known addresses (n=1,752). Responses were received from 710. Survey packages were mailed to the 355 (50%) who consented to participate. Packages contained: 3 health measures (including the Health Utilities Index) and a single question asking for their general health rating (GHR). Data from 292 completed surveys were analyzed to describe the health of 193 youth and 99 adults.

**Results:** The sample ranged in age from 13 to 17.9 and from 23 to 32.9 years of age and 47% was female. Many (51.0%) were able to walk outside, 19.8% were able to walk only indoors, and 29.2% were unable to walk at all. The general health ratings were "excellent" for 21.0%, "very good" for 33.2%, "good" for 30.8% and "fair" or "poor" for 15.0%. The mean HUI score for the group was 0.37 (SD=0.40), with 23.6% reporting health states worse than death.

**Conclusion:** This study shows a diverse range of health scores. The GHR's indicated good health; whereas, the HUI scores indicate poor health and were much lower than scores reported for adults with other severe chronic conditions (0.87<sup>1</sup>). Study is ongoing to understand the disparity in these results and the health related issues faced by individuals with childhood acquired disabilities.

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<sup>1</sup> Kopec JA, Schultz SE, Goel V, and Williams JI. *Can the health utilities index measure change?* Medical Care, 2001. 39(6): p. 562-74.



A22

### **FOUR-AMINOPYRIDINE (4AP) IMPROVES PULMONARY FUNCTION IN HIGH TETRAPLEGIA: A CASE STUDY**

*Christine Short MD, FRCPC, Division of Physical Medicine and Rehabilitation, Dalhousie University, Halifax, NS.*

**Background:** Spinal cord injury can have devastating effects on function. After injury to the spinal cord (SCI) many nerve tracts are irreversibly damaged while others are only partly damaged. There are now pharmacological agents that can improve nerve conduction in partly damaged nerve tracts resulting in improved function. Four amino-pyridine (4AP) improves nerve conduction by blocking fast acting voltage gated potassium channels. In clinical studies in persons with incomplete SCI, 4AP has been shown to improve a large range of functions including spasticity, motor control, sexual and bowel function. In a medline search we found only one study, in which a single dose of 4AP improved respiratory function in individuals with chronic, high tetraplegia. We found no literature regarding its longterm use for improving pulmonary function.

**Objective:** To evaluate the effect of 4AP on pulmonary function in high tetraplegia.

**Method:** A case study of a 43 year-old gentleman with C4 ASIA B tetraplegia and slowly deteriorating pulmonary function.

**Results:** 10mg of 4AP TID was well tolerated and resulted in improved pulmonary function. Peak flows increased from 130L/min to 260 L/min and this improvement was sustained. This was associated with improved chest radiographs with re-inflation of the left lung that had been chronically atelectatic. The patient was able to discontinue his longstanding nocturnal nasal bipap, without compromise in overnight oxygen saturations.

**Conclusion:** 4AP appears to have benefits on pulmonary function in high tetraplegia. More research is needed to establish if this is a consistent clinical response that may benefit others.



A23

**POSTSTROKE TREATMENT WITH CANNABINOID FOR NEURONAL REGENERATION.**

**Christine P. Yang\* and Xia Zhang.** \**Department of Physical Medicine & Rehabilitation, College of Medicine, University of Saskatchewan*

**Background:** Stroke is the 2<sup>nd</sup> leading cause of adult disability produced by the permanent loss of neurons in certain brain regions. Recent studies in rodents have demonstrated a prominently increased generation of newborn neurons following ischemic stroke, indicating the possibility of neuronal replacement from endogenous neural stem cells in the adult brain. However, this self-repairing strategy seems obscure because the majority of the newborn neurons die during the first weeks following ischemic stroke (Arvidsson et al., *Nature Medicine* 2002, 8:963).

**Objective:** To examine the protective effects of poststroke treatment with the potent cannabinoid HU210 on the survival of newborn neurons induced by global ischemia.

**Methods:** We employed a widely used rat model of global ischemia, which was established by occlusion of all the vertebrate and carotid arteries for 30 min, followed by reperfusion. The first 2 groups of 5 rats each received ischemia and the 3<sup>rd</sup> group received sham operation without ischemia. On days 4 and 5 post operation, all the rats received intraperitoneal injections of the chemical BrdU (50 mg/kg) to label the newborn neural cells, followed 2 hours later by twice daily intraperitoneal injections of HU210 (100 µg/kg, group 1) or vehicle (groups 2 and 3) for 2 weeks. Rats were sacrificed 1 day later.

**Results:** Sham-operated rats did not show BrdU-labeled newborn neurons in the hippocampus; Ischemic rats with vehicle treatment exhibited some newborn neurons in the hippocampal CA1 area, where global ischemia usually produced severe neuronal loss; Chronic HU210 treatment produced significantly more newborn neurons in the CA1, relative to vehicle treatment.

**Conclusion:** These results support the notion that poststroke treatment with chronic HU210 protects the survival of newborn neurons, thus suggesting a novel therapeutic strategy with poststroke cannabinoid treatment for replacing neuronal loss by promoting brain self-repair.



A24

**CAN BOTULINUM TOXIN IMPROVE GAIT IN PERSONS WITH INCOMPLETE SPINAL CORD INJURY?**

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**Objective:** To evaluate the effect of botox on ambulation capabilities in persons with incomplete Spinal Cord Injury (SCI).

**Background:** Spinal Cord Injury can have devastating impacts on function. Many individuals who suffer incomplete SCIs regain the ability to ambulate. These individuals face many challenges including spasticity, which can interfere significantly with walking capabilities. In SCI, spasticity in individual muscles or muscle groups may cause problems with gait and ambulation that may be amenable to local tone reducing therapies such as botulinum toxin.

**Methods:** In 4 patients presenting with spastic gait and SCI we administered botulinum toxin to one or both lower extremities. Ambulation parameters before and after treatment were assessed using a well, validated ambulation profile tool developed at our centre.

**Results:** We observed improvements in ambulation speed, ambulation on uneven surfaces, ability to ascend and descend inclines and stairs; as well as overall improvements in total ambulation capability. Post treatment this allowed two of our subjects to become independent in walking related activities that they required assistance for prior to treatment. Subjectively individuals also reported improved clonus, decreased tone, decreased pain and greater ease of ambulation.

**Conclusions:** Botulinum toxin may have an important role in improvement of ambulation capabilities in persons with incomplete SCI. Further research in this area is needed.



A25

## HOME VERSUS CENTRE BASED PHYSICAL ACTIVITY PROGRAMS IN OLDER ADULTS

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**Objective:** To assess the effectiveness of 'home based' versus 'center based' physical activity programs on the health of older adults.

**Methods:** A systematic (Cochrane) review of randomized controlled trials in the World literature of different physical activity interventions in older adults (50 years or older).

**Results:** Eventually six eligible trials were accepted for this systematic review. Collectively they included 224 participants who received a 'home-based' exercise program and 148 who received a 'center-based' exercise program. Five studies were of medium quality and one poor.

### 1) Cardiovascular

The largest trial found (accounting for approximately 60% of the participants) looked at sedentary older adults. Three trials looked at patients with peripheral vascular disease (PVD).

In patients with PVD center-based programs were superior to home at improving distance walked and time to claudication pain at up to 6 months. Notably home based programs appeared to have a significantly higher adherence rate than center based programs. However this was based primarily on the one study (with the highest quality rating of the studies found) of sedentary older adults that accounted for 60% of the total participants in the systematic review. This showed an adherence rate of 68% in the home based program at two year follow-up compared with a 36% adherence in the center based group. There was essentially no difference in terms of treadmill performance or cardiovascular risk factors between groups.

### 2) Chronic Obstructive Pulmonary Disease (COPD)

Two trials looked at older adults with COPD. In patients with COPD the evidence for the superiority of one type of program over another is conflicting.

### 3) Osteoarthritis

No studies were found

**Reviewers' conclusions:** Home based programs appear to be superior to center based programs in terms of the adherence to exercise (especially in the long term). In the short term center based programs are superior to home based programs in patients with PVD.



**A26**

**A COMPARISON OF OUTCOME USING EFFECT SIZES (R): SPECIALIZED STROKE REHABILITATION SERVICES AND THROMBOLYTIC THERAPY WITH RT-PA**

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*Department of Physical Medicine and Rehabilitation, Parkwood Hospital, St. Joseph's Health Care London, London, Ontario*

**Objective:** The combined outcome of death and disability at three months following stroke was compared for patients who received specialized inpatient stroke rehabilitation services and those treated with recombinant tissue plasminogen activator (rt-PA).

**Method:** A literature review of randomized controlled trials for both treatments found eight trials published between 1992-1999 evaluating the efficacy of rt-PA and 12 studies for stroke rehabilitation from 1970-2001. Treatment effects were expressed as effect sizes using Mullen's formulae for product moment effect size ( $r$ ), which range from  $-1.0$  to  $1.0$ .

**Results:** The average effect size for studies evaluating rt-PA compared to placebo was  $0.07798$  (95% CI :  $0.0474, 0.1941$ ), indicating a small, but significant treatment effect. The average overall effect size associated with specialized stroke services was  $0.0689$  (95% CI:  $0.0334, 0.1041$ ). The overlapping confidence intervals associated with the overall treatment effect suggest that there was no statistically significant difference between the treatment groups.

**Conclusions:** Although both treatments can reduce the negative outcome of death or disability, the applicability of stroke rehabilitation is broader, especially for patients with moderately severe strokes.



A27

## DEVELOPMENT OF A LUNG VOLUME RECRUITMENT ADHERENCE MEASUREMENT DEVICE FOR TETRAPLEGIC PATIENTS

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**Objectives:** To develop an accurate, dependable and practical method of measuring adherence to lung volume recruitment (LVR) in tetraplegic patients.

**Methods:** A resuscitation bag equipped with an extension tube, mouth piece and one-way valve is routinely used for breath-stacking (LVR) and maintenance of pulmonary health in spinal cord injured patients at The Rehabilitation Centre (TRC). This standard equipment was fitted with a minimum-threshold pressure triggered digital counting device and a mouth piece pressure activation switch. Activation of the device required simultaneous depression of the switch embedded within the mouth piece and sufficient air pressure sensed by the counting device. Patients were instructed on how to use the apparatus appropriately and were aware of its intention to measure adherence to LVR but were blinded to the precise method of its recording. This setup was created to make it extremely difficult for patients to deceive the measurement device.

Validation of the LVR counting device was performed in mid-to-lower level (C4-C8) tetraplegic patients at TRC. Counts of LVR in the form of stacked breaths were recorded by the device over a one week period and compared for accuracy to those recorded by an experienced health care provider observing patient use of LVR (gold standard).

**Results:** Preliminary results have shown this LVR counting device to be greater than 98% accurate in measurement of patient use of LVR. Minimal undercounting occurred rarely. The addition of the recording equipment adds very little weight and does not interfere with patient use.

Data on additional patients is currently being collected for analysis. The device is capable of continuously collecting data for up to one year. Longer-term use in the home-based setting is currently being evaluated.

**Conclusions:** This device appears accurate in measurement of patient adherence to LVR. Obtaining data on patient adherence to LVR will provide a better understanding of factors that influence its usage among spinal cord injured individuals as a method of maintaining pulmonary health. Additional data collection is ongoing in the acute rehabilitation setting. Further studies will involve longer-term data collection and determination of patient adherence in an outpatient setting.



A28

**PSYCHOMETRIC PROPERTIES OF A NOVEL WALK TEST AMONG A GROUP OF HOSPITALIZED ELDERLY INDIVIDUALS**

*Nguyen VC, Miller WC, Asano M, Wong R.*

**Objective:** To evaluate the reliability and validity of the L-Test among a group of elderly individuals.

**Design:** Test-retest design.

**Setting:** A university-affiliated tertiary care hospital in Vancouver.

**Participants:** Consecutive sample of 50 older adults admitted to an acute care for elders unit.

**Interventions:** Not applicable.

**Main Outcome Measures:** Repeated application of the L-Test, a performance-based walk test that quantifies mobility disability. Correlation to test hypothesized relationships between the L-Test and the Timed “Up & Go” Test (TUG) and Short Physical Performance Battery (SPPB). Logistic regression to test predictive validity regarding discharge destination.

**Results:** Interrater and intrarater reliability (intraclass coefficient) of the L-Test was 1.00 and 0.97 respectively ( $p < 0.005$ ). Hypothesized associations with the TUG and SPPB were observed ( $r = 0.96$  and  $r = -0.45$  respectively;  $p < 0.01$ ). The L-Test was a statistically significant predictor of home discharge following hospitalization (odds ratio = 1.05; 95% CI = 1.01-1.09).

**Conclusions:** The L-Test is a psychometrically sound (reliable and valid) method of assessing mobility disability in hospitalized older adults. It provides a method of predicting the likelihood of their return home following hospitalization. The L-Test has the potential to become an important clinical and research tool, designed to enhance and investigate household mobility in older adults.



A29

## ASSESSING THE EFFECTS OF STROKE REHABILITATION ON PARTICIPATION OUTCOMES

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**Objective:** Rehabilitation medicine is increasingly interested in exploring the effects of interventions not only on functional ability as it relates to the execution of specific tasks or activities, but also on the individual's perceived ability to assume social roles and be involved in life situations. The present study sought to determine both the frequency with which participation outcomes are assessed in published randomized controlled trials of stroke rehabilitation interventions and the areas of intervention in which participation outcomes are assessed most often.

**Methods:** An extensive literature search was used to identify all trials from 1995-2004, evaluating stroke rehabilitation efficacy. RCTs were allocated to one of 15 intervention categories. Cited measures were recorded and primary outcomes noted. The number of participation outcomes within each category was tabulated.

**Results:** Forty-nine studies (out of 430 identified RCTs) cited the assessment of 60 outcomes corresponding to the level of Participation as defined by the WHO International Classification of Functioning, Disability and Health (ICF). Only 10 of these studies cited a participation outcome as the primary outcome of interest. Studies were classified into 15 main subject categories. Examination by subject category revealed that interest in participation outcomes was found principally among studies focused on community re-integration and the efficacy of community-based rehabilitation programs. There were few attempts to assess the effect of rehabilitation interventions on outcomes at the level of social function or individual perceptions of overall health status or quality of life within any of the other defined subject categories.

**Conclusions:** Ongoing study of intervention in stroke rehabilitation should include assessments at the level of participation in order to help develop models of intervention that will enhance outcomes at this level.



**A30**

**HEALTH-RELATED QUALITY OF LIFE AND STROKE REHABILITATION: WHAT ARE WE MEASURING?**

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**Objective:** While there is no universally agreed upon definition of health-related quality of life (HRQOL), it is generally assumed to be a broad, multi-dimensional construct referring to those aspects of people's lives reasonably relating to their health. There are many scales currently used for the purpose of HRQOL assessment. We undertook a review of the most commonly used scales to determine both what is being assessed and to what extent important HRQOL domains are addressed within each.

**Methods:** Dimensions identified within the published literature as relevant to patient-based assessment were compiled and defined previously. Using this established conceptual framework, HRQOL measures were examined. Five generic tools and 3 stroke-specific tools were included in this review.

**Results:** All measures reviewed were multi-dimensional but varied in comprehensiveness. All scales included assessment of physical functioning and most incorporated concepts such as psychological well-being, social well-being and role activities. None addressed personal constructs such as satisfaction with appearance, stigma and/or stigmatising conditions, life satisfaction or spirituality. The SF-36 was the most comprehensive of the generic tools, while among condition –specific assessments, the Stroke Impact Scale (SIS) appeared most comprehensive. Comprehensive assessment provides information regarding the broad impact of health state and treatment.

**Conclusions:** There is increasing emphasis on assessments yielding information about the impact of stroke and stroke rehabilitation interventions on quality of life. This is important both for patients who value information about the broad impact of stroke and stroke rehabilitation interventions on their lives and for healthcare professionals and policy makers in deciding upon appropriate treatments and allocation of resources. Further clarification of the concept of health-related quality of life and the link between clinical care and health-related quality of life is required.



A31

**FUNCTIONAL OUTCOMES AND PROGNOSTIC FACTORS IN BILATERAL BELOW KNEE AMPUTEES (BBKA)**

**H. Mac Neill MD, BSc (PT), M. Devlin MD, FRCPC, T. Pauley, MSc, Alexandra Vdzenkovska**

**Objective:** To determine the success of BBKA inpatient rehabilitation by objective early and long term outcome measures, and determine prognostic factors related to BBKA rehabilitation success, such as first prosthetic below knee fitting success compared to the second below knee prosthetic fitting.

**Methods:** A convenience sample of 93 consecutive diabetic or vascular BBKA patients admitted to a community rehabilitation center between 1998 and 2004 for prosthetic or non-prosthetic rehabilitation were obtained from a database. Retrospective database analysis and confirmatory chart review of both unilateral and bilateral amputee admissions were utilized. Patients were also interviewed by telephone or during regularly scheduled clinic visits.

**Preliminary Results:** The majority (92%) of BBKA patients were prosthetic candidates (vs. 96% being unilateral below knee prosthetic users). Patients tended to be sicker with more co-morbidities and sent home to heal more often than during their first admission. Despite this, there was little difference in the discharge Houghton (self reported prosthetic use) from their first and second admissions, but there was an increased use of more supportive gait aids after their second admission. On long-term follow-up the majority of patients continued to be prosthetic users (86%). Based on the Frenchay Activity Index, most maintained independence in basic ADL's, but lost their iADL's, leisure and social function. Thirty-eight percent lived alone.

**Conclusions:** There was a high prosthetic candidacy rate for BBKA referred to rehabilitation, and the majority continues to wear their prosthesis long term. While the amount of prosthetic wear was relatively unchanged compared to their unilateral usage, their quality of gait may be less, as evidenced by the gait aid required at discharge. BBKA patients tended to remain fairly independent in their ADL's, but may lose their social function and higher ADL's.



A32

## TACHYKININS DIFFERENTIALLY MODULATE JOINT DAMAGE IN INFLAMMATORY ARTHRITIS

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\* Both are first co-authors

**Objectives:** Joint pain, inflammation and cartilage destruction are the main events in inflammatory arthritis conditions such as rheumatoid arthritis (RA). Clinical studies have related the involvement of the peripheral nervous system in the pathogenesis of this disease. Experimental work has, however, oversimplified this involvement by categorizing neural influences based on fiber types, labeling sensory fibers as pro-inflammatory and sympathetic fibers as anti-inflammatory. This generalization hampers the understanding of neural mechanisms in arthritis and the advent of improved therapies. The aim of this work is to study the roles of neuropeptides and neuropeptide antagonists in inflammatory arthritis.

**Methods and Results:** In a rat model of an adjuvant-induced inflammatory erosive monoarthritis, we demonstrate that denervation of the joint exacerbates the symptoms of the disease. Subsequently, blockade of sensory fibres leads to an improvement whereas blockade of sympathetic fibres causes an exacerbation of symptoms. We also show that individual blockade of the tachykinin receptors for substance P or NKA, two neuropeptides released from the same nerve terminal, can differentially modulate the severity of the disease. Thus, blocking the actions of substance P improved most symptoms of the disease, whereas blockade of NKA-induced effects exacerbated joint destruction.

**Conclusion:** These observations reveal that different nerve fibers modulate the symptoms of arthritis, but perhaps more importantly, we have identified opposing roles for neurochemicals within the same neuronal population in this modulation. This study might also shed some light on the therapeutic potential of neuropeptides or neuropeptide antagonists, in particular substance P, in the treatment of arthritis.



A33

## EVIDENCE-BASED PRACTICE AND SETTING NATIONAL STANDARDS IN STROKE REHABILITATION

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**Introduction:** Evidence-based practice in stroke rehabilitation attempts to implement the results of research studies (evidence) and translate those results into improved clinical practice.

**Objective:** To develop evidence and consensus-based standards of stroke rehabilitation care.

**Methods:** Based on the Stroke Rehabilitation Evidence-Based Review, evidence was provided to support six basic standards of stroke rehabilitation care. Two meetings of the Stroke SIG in Edmonton in 2003 and Charlottetown in 2004 reached a consensus on stroke rehabilitation standards.

### Results:

Six stroke rehabilitation standards were agreed to:

1. Stroke survivors should have immediate access to interdisciplinary specialized stroke rehabilitation.
2. Appropriate stroke patients should have early access to rehabilitation.
3. Stroke survivors should have access to the appropriate levels of rehabilitation services throughout the continuum of care; a minimum of one hour of each therapy as part of inpatient rehabilitation care.
4. Outpatient therapy should be made available to appropriate stroke patients on discharge from hospital.
5. Social support systems should be made available to stroke survivors and their caregivers after discharge home.
6. Secondary prevention of stroke should be considered an integral part of stroke rehabilitation.

**Conclusions :** These agreed to standards should form the basis of a stroke patient's "rehabilitation bill of rights". Sufficient evidence is available to develop consensus-based stroke rehabilitation standards of care.

*This work has been supported by the Canadian Stroke Network and Heart and Stroke Foundation.*



A34

**DRIVING POST STROKE: SAFETY OUTCOMES AND DRIVING FREQUENCY FOLLOWING FORMAL DRIVING ASSESSMENTS – A PILOT PROJECT**

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- 3. Medical Director, Traumatic Brain Injury Program, The Rehabilitation Centre and Élisabeth Bruyère Health Centre*

**Objective:** The driving safety and habits of stroke survivors is only minimally discussed in the literature. The purpose of this study is to document these outcomes, and to attain better awareness of the driving and transportation needs of this population group.

**Methods:** This is a retrospective cohort design. Stroke survivors (n=232), who completed a driving assessment at a Ministry approved driving evaluation program located in a tertiary care rehabilitation centre, were surveyed regarding their driving status, driving exposure, current use of transportation options, self-imposed driving restrictions, traffic accidents/violations, and current health status.

**Results:** Sixty-eight surveys were completed; 68% of the respondents were still driving (more non-drivers declined participation); 73% were male, and the majority were driving almost everyday. Drivers did not impose restrictions on their driving, and < 10% received a traffic ticket or were involved in a traffic accident. Non-drivers relied on public transportation and others' driving. There was no difference in current health status among drivers and non-drivers (p>0.05).

**Conclusions:** Some post stroke drivers are driving safely and infrequently self-impose driving restrictions. The participation of subjects in driving related research can be problematic as is likely demonstrated in this study. Methods to increase subject participation are required.



A35

## WHAT IS A STROKE UNIT?

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**Objective:** The results from a several meta-analyses suggest that care received on a dedicated stroke unit is associated with an improved outcome following acute stroke. However, individual randomized controlled trials (RCTs) provided varying definitions of a stroke unit. These differences were based on time to admission and length of treatment. The purpose of this study was to assess whether a good outcome prevailed regardless of the type of stroke unit in which care was provided.

**Methods:** All RCTs included in a recent review of stroke unit/rehabilitation care were identified, and organized into three groups; i) acute stroke unit care (patients admitted within 24 hours of onset of stroke and remained for up to two weeks), ii) units combining acute and rehabilitative care (integrated) and, iii) rehabilitation units where patients were transferred onto the service approximately two weeks following stroke (subacute). Primary study outcomes were recorded and dichotomized as either positive or negative. Results were summarized by stroke unit group.

**Results:** Thirteen trials were identified. Primary outcomes included mortality, percentage of patients discharged home and the proportion of patients who were independent in activities of daily living. The timing of evaluation of outcome ranged from 14 days to one year. Three trials fit the definition of an acute stroke care model. All three trials reported negative results. Six trials incorporated acute and sub acute components of rehabilitation and reported mixed results; four were positive, while two were negative. Finally, four trials were identified in which only sub acute rehabilitation was provided. The results of these trials were positive.

**Conclusions:** Acute rehabilitation, offered for short periods of time, is not as effective as sub-acute or integrated rehabilitation efforts in improving outcome post stroke.



**A36**

**VELOCITY VERSUS POSITION DEPENDENT SPASTICITY: ANOTHER LOOK AT THE PENDULUM TEST**

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**Introduction:** People with a spinal cord injury often report differences in spasticity in lying versus sitting. The Wartenberg Pendulum Test (WPT) can be used to assess spasticity. The purpose of this study was to assess the magnitude of angular displacement ( $^{\circ}$ ) and mean velocity ( $^{\circ}/s$ ) of the knee in a C6 ASIA B person with spasticity in the sitting versus lying position during the pendulum test.

**Methods:** The subject was positioned with both legs hanging over the edge of a therapeutic bed. A MiniBird six degree-of-freedom DC magnetic motion sensor from Ascension Technology (18x8x8 mm) was secured to skin on the leg a consistent distance from the joint line of the knee. The examiner then extended the knee and released the foot, allowing the leg to swing through a complete range of motion. This procedure was followed on both legs in sitting and then supine lying.

**Results:** The motion sensor was interfaced to a computer which recorded angular 3D coordinates at a sample rate of 100Hz. The magnitude of angular displacement ( $^{\circ}$ ) in sitting was  $77.4^{\circ}$  and  $54.2^{\circ}$  on the right (R) and left (L) legs respectively. In lying, the magnitude of angular displacement was  $6.1^{\circ}$  (R) and  $9.6^{\circ}$  (L). The mean velocity (degrees/second) in sitting was recorded to be  $407.5^{\circ}/s$  (R) and  $387.1^{\circ}/s$  (L). In lying, the mean velocity was  $33.8^{\circ}/s$  (R) and  $30.09^{\circ}/s$  (L). Thus, we recorded over a 10-fold decrease in angular displacement and mean angular velocity in the supine position.

**Conclusions:** This data suggests that positional effects may have a greater impact on spasticity than velocity-dependent effects alone. Possible segmental mechanisms to explain the substantial difference in spasticity between lying and sitting include: increased stretching of 2-joint extensor muscles in supine and/or increased reciprocal Ia inhibition from the hamstrings in sitting.



A37

**FEASIBILITY, MOTIVATION AND EFFICACY OF A VIRTUAL REALITY EXERCISE PROGRAM COMPARED TO A CONVENTIONAL HOME EXERCISE PROGRAM IN CHILDREN WITH AND WITHOUT CEREBRAL PALSY**

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**Objectives:** To determine whether children with and without CP would report greater interest and fun, and whether ankle movement would differ with a virtual reality (VR) exercise program as compared to a home exercise program for ankle selective motor control.

**Methods:** Participants were seven to seventeen year-old independent ambulators without CP (4 male) and with spastic hemiplegia (3 male, 5 female). Participants completed two conventional home program exercises (A) and two VR exercises (B) (AB-BA or BA-AB.) Both programs involved controlled unilateral ankle dorsiflexion. Participants with CP used their affected leg and those without CP used their preferred leg. An electrogoniometer attached to the ankle measured joint range-of-motion. Outcome measures used included: (1) visual analogue scales (VAS) of the child's perception of interest and fun; (2) VAS of the parent's perception of their child's fun and interest; (3) the ankle range of motion into dorsiflexion during each repetition, the time to complete each repetition, the length of time the ankle was maintained in dorsiflexion during each repetition and the number of repetitions for each exercise.

**Results:** Children with and without CP reported higher scores on the "fun" and "interest" VAS when completing the VR versus conventional exercises. Both groups took more time to complete each repetition, maintained the ankle in the dorsiflexed position for a longer period and actively moved the ankle through a greater range of motion when doing the VR program exercises.

**Conclusion:** The findings support the use of virtual reality to improve interest and promote compliance in a home exercise program. The effectiveness of a home-based program may also improve with the integration of VR but longer term study is needed.



A38

### DUCHENNE MUSCULAR DYSTROPHY CLINICAL PATHWAY

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**Objective:** To develop a tool that promotes comprehensive, coordinated, efficient and effective multidisciplinary care for individuals aged 0-18 years with Duchenne Muscular Dystrophy.

**Methods:** An experienced, multidisciplinary, neuromuscular team developed a unique, comprehensive, clinical pathway spanning the ages 0-18 years. This was developed through consensus and an up-to-date literature review. The pathway subdivides the clinical condition into 4 functionally defined stages. The aspects of care required and expected outcomes for each stage are defined to ensure that team goals are achieved as care is provided.

**Results:** The entire pathway, as currently utilized at the Children's Hospital of Eastern Ontario will be provided. Steps in development are outlined and the future plans for evaluation and database development are highlighted.

**Conclusion:** In a progressive, multi-system disease such as Duchenne Muscular Dystrophy, complications can be life threatening and timely interventions life saving. There are also significant equipment needs, families need to plan carefully and family stress is enormous.

Clinical pathways are becoming more common within pediatric health care centers. They provide important structure and assist to ensure a high quality standard of care for the children and families we serve. As well, pathways provide important information for resource planning and research data base development.



A39

### ATTENTION TEST AS A PREDICTOR OF ONE-YEAR OUTCOME IN ABI PATIENTS

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**Background:** Few outcome measures have demonstrated effectiveness in predicting outcomes following an Acquired Brain Injury (ABI).

**Hypothesis:** Attentional neuropsychometric tests are predictors of functional outcome in ABI patients at one-year post injury.

**Method:** 37 ABI patients (mean age of  $44 \pm 18.78$ ) were admitted to an inpatient multidisciplinary neurorehabilitation program for  $62 \pm 40.11$  days of multidisciplinary therapy and neuropsychological assessment that included the following tests, Symbol Digit Modalities Verbal test, Digit Span Forward, Digit Span Backwards, Rey Auditory Verbal Learning test, and WAIS III Block Design. The Disability Rating Scale (DRS) was used to assess function in patients at admission, discharge and one year after their injury. A linear regression model was applied to assess predictive value at one-year post injury.

**Results:** DRS at one year was significantly predicted by DRS at admission ( $p=0.0053$ ), along with Digit Span Forward ( $p=0.0167$ ). The remaining tests were not significant.

**Conclusion:** This short assessment tool, Digit Span Forward, predicted DRS at one-year post injury better than the other 5 tests used in this study. This supports the hypothesis that attentional neuropsychological tests are good predictors of functional outcome and may be adequate in this simplified form. Further exploration is warranted.



**A40**

**A SYSTEMATIC REVIEW OF THE REHABILITATION OF MODERATE TO SEVERE ACQUIRED BRAIN INJURIES**

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**Objective:** To conduct a systematic review of the rehabilitation literature of moderate to severe acquired brain injuries (ABI) from traumatic and non-traumatic causes.

**Methods:** A careful review of the literature was performed. References were reviewed by 2 reviewers, each of whom selected those studies with some possibility of data related to the treatment of ABI patients. The abstracts of the references which were selected were then reviewed by 2 reviewers, and articles with > 50% ABI patients, at least 5 patients, and an intervention with measurable outcomes were chosen for data abstraction. These articles were carefully reviewed by researchers who then extracted data related to the efficacy of the therapeutic intervention and assessed the methodological quality of each study using the Downs and Black scale, a well accepted tool for the assessment of randomized controlled trials (RCTs) and non-RCTs.

**Results:** Almost 14,000 references were reviewed from which 1,000 abstracts were chosen. 430 of these were chosen for careful data analysis from which levels of evidence were determined. Only 47 of these articles were randomized controlled trials (RCTs).

**Conclusion:** Despite a wealth of articles regarding ABI rehabilitation, only about 10 % were RCTs and more research is needed into ABI rehabilitation.

*This study was funded by the Ontario Neurotrauma Foundation.*



**A41**

**A COMPARISON OF RANDOMIZED CONTROLLED TRIALS IN THE REHABILITATION OF STROKE AND ACQUIRED BRAIN INJURY (ABI)**

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**Objective:** To compare the methodological quality & sample size of randomized controlled trials (RCTs) of stroke and acquired brain injury (ABI) rehabilitation.

**Methods:** We conducted two systematic reviews of the stroke and ABI rehabilitation literature with a focus on efficacy of therapeutic interventions, limited to randomized controlled trials (RCTs). Methodological quality was assessed using the PEDro scale. Both reviews were conducted in a similar manner.

**Results:** The Stroke Rehabilitation Evidence-Based Review (EBR) identified 392 RCTs dealing with stroke rehabilitation from approximately 3,500 abstracts reviewed. The average sample size was  $86.24 \pm 99.97$  and the mean PEDro score was  $5.86 \pm 1.4$ . The ABI EBR identified only 47 RCTs dealing with ABI rehabilitation from approximately 1,000 abstracts reviewed. The average sample size was  $51.43 \pm 76.96$  and the mean PEDro score was  $5.45 \pm 1.65$ . There were no statistically significant differences in PEDro score between the stroke and ABI RCTs ( $p = 0.0636$ ).

**Conclusions:** Compared to the stroke rehabilitation literature, there are far fewer RCTs for the rehabilitation of ABI (392 vs. 47). For stroke rehabilitation, the literature into interventions is more comprehensive; here the focus needs to be on identifying the research gaps and focusing on implementing the current findings from the literature into clinical practice. The ABI Rehabilitation literature is not as comprehensive as the stroke literature, and thus the focus needs to be more on improving the current literature and developing consensus guidelines while awaiting future research.

*Funding from the Ontario Neurotrauma Foundation, Heart and Stroke Foundation, Canadian Stroke Network and Toronto Rehabilitation Institute.*



**A42**

**CALCANEAL DEXA TO INDICATE ACHILLES TENDON HEALTH AND REPAIR**

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**Objective:** To assess the ability of 3 non-invasive diagnostic tests to predict the mechanical properties of Achilles tendons in 3 different experimental models.

**Methods:** 78 rabbits had both Achilles tendons studied in three separate groups. First and second groups included 22 rabbits which had their leg casted for 4 weeks and 20 for 8 weeks. Control groups included contralateral (n=42) and normal legs (n=12 legs). In a different model, rabbits recovered either 4 weeks (n=10) or 8 weeks (n=10) from a tendon injury, with similar controls (n=32 tendons). Clinical outcome measures included Achilles tendon ultrasounds, MRI and DEXA of the calcaneus bone for groups 2 and 3. Mechanical testing of tendons kept the calcaneus anchor in the first group and isolated the Achilles tendon in groups 2 and 3.

**Results:** In all three models, the best predictor of tendon strength was the calcaneus bone density with Pearson's correlations between bone density and peak load to failure in groups 2 and 3 at respectively: 0.36 and 0.40, both  $p < 0.05$ . No other outcome measure correlated with the mechanical changes. Mechanical testing including the bony entheses appeared the highest correlator.

**Discussion:** In musculoskeletal rehabilitation, the precise quantification of tendon strength is critical, yet still unavailable. Mechanical properties of tendons correlated best with the calcified bone content at the tendon attachment in three different experimental situations. Our results do not support the use of US or MRI for this clinical indication. Ongoing human studies will clarify how strongly the recommendation to use DEXA should guide the loading of tendons during rehabilitation.



**A43**

**DO YOU KNOW WHO I AM? DELUSIONAL MISIDENTIFICATION SYNDROME FOLLOWING MILD TRAUMATIC BRAIN INJURY**

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Psychiatric sequelae are known to occur following Traumatic Brain Injury (TBI). The adjusted relative risk for any psychiatric illness within 6 months of mild traumatic brain injury is 2.8. Symptoms may range from depression, anxiety, phobia, substance abuse, to psychosis. Post-TBI psychosis occurs in 1-8.9% of TBI patients, with variable onset latencies. We present a 65-year-old female who experienced a mild traumatic brain injury and poly-trauma due to a motor vehicle collision. She developed persistent delusions within days of her injury. Organic causes of delirium were ruled out. Her delusions resulted in her consistently misidentified the rehabilitation resident and the psychologist as insurance adjusters, the physiotherapist as a banker, the physiotherapy department as the bank, and the ward dining room as the Bingo hall. The delusional misidentifications persisted without improvement at four months post injury. Impact of this syndrome on this patient's ability to participate in an active rehabilitation program and implications for management with environmental, behavioral and pharmacological measures will be presented.



**A44**

**PREDICTING RETURN TO WORK AFTER LUMBAR SPINE SURGERY IN A COMPENSATION POPULATION**

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Studies of general populations undergoing lumbar spine surgery consistently identify workers' compensation or litigation as the major predictors of surgical failure.

**Objective and Methods:** To build a model predictive of surgical outcome in a poor prognostic group, the Ontario Workplace Safety and Insurance Board (WSIB) population. A retrospective cohort study was conducted to determine which prognostic factors, mined from the WSIB database, contribute to outcome of lumbar spine surgery, as measured by return to work or retraining.

**Results:** Successful return to work occurred in 51.7% of 838 patients who had lumbar surgery in 1993-1994. Univariate analysis identified age, duration of employment, extent of surgical procedure, historical red flags, prior lumbar surgery, delay between injury and surgery, lack of intra-operative scar reduction measures, and lack of symptom-congruent radiological findings as predictors of failure. However, only the first 4 factors achieved statistical significance in logistic regression. A model including age >50 years, < 2 years duration with the injury employer, more extensive surgery, and presence of red flags in the history predicted surgical outcome better than chance. This model was evaluated in a further set of 115 patients.

**Conclusions:** A model using routinely-measured factors, including some unrelated to the traditionally-used clinical definitions for surgical candidacy, can predict surgical outcome.



A45

**A RANDOMISED CONTROLLED TRIAL OF SATIVEX, A CANNABIS BASED MEDICINE, IN CENTRAL NEUROPATHIC PAIN DUE TO MULTIPLE SCLEROSIS.**

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**Aim of Investigation:** To compare the efficacy and tolerability of Cannabis Based Medicine (CBM) with placebo in the relief of central neuropathic pain (CNP) due to multiple sclerosis (MS).

**Methods:** The efficacy and tolerability of CBM, a whole plant cannabis medicine containing  $\Delta$ -9 tetrahydrocannabinol (THC) and cannabidiol (CBD), was investigated in a randomised, double-blind, placebo-controlled, parallel-group trial of 66 MS patients with CNP. CBM was administered as an oromucosal spray over a four week treatment period, each spray delivering 2.7mg THC and 2.5mg CBD. Patients were allowed to self-titrate their dosage. Patients were maintained on their existing analgesic medications.

**Results:** Sixty four patients completed the trial. Fourteen patients were male, mean age 49.2 years, mean EDSS 5.9 and mean duration of MS since diagnosis 11.5 years. The mean number of daily sprays taken in the final week of treatment was 9.6 of CBM, and 19.1 of placebo. Thirty patients on CBM and 22 on placebo had at least one adverse event, none of which were serious. Significant mean reductions favouring CBM were found on 11 point numerical rating scales, (0 = none, 10 = worst), in both the primary outcome of pain ( $p = 0.005$ ), and sleep disturbance ( $p=0.003$ ). A significant mean reduction in pain with CBM compared with placebo was also demonstrated using the 10 item, 100 point Neuropathic Pain Scale ( $p = 0.044$ ). On a 7 point Patient's Global Impression of change, those treated with CBM were 3.9 times more likely to rate themselves in an improved category than those receiving placebo ( $p = 0.005$ ).

**Conclusions:** Sativex is efficacious and well tolerated as a treatment for CNP due to MS.



A46

**CHANGES IN SUBLESIONAL BONE MINERAL DENSITY IN WOMEN WITH SPINAL CORD INJURY: A TWIN STUDY**

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The present study investigated the changes in bone density, bone geometry and muscle cross-sectional area (CSA) in two sets of female twins, where one of each twin pair had previously sustained a spinal cord injury (SCI). The ages of twin pair one (TP1) and twin pair two (TP2) were () and () respectively. The level of lesion in the SCI twins was C7 (tetraplegia) and T8 (paraplegia), and time post-injury were 5 and >20 years, respectively. Bone mineral densities of the proximal femur, distal femur, proximal tibia, and spine were measured using dual-energy x-ray absorptiometry (DXA). Computed tomography was used to measure volumetric bone densities, bone geometries and muscle CSAs of the thigh (mid-femur) and lower leg (66% tibia length, proximal to knee). Dramatic differences in bone and muscle variables were noted when SCI and non-SCI twins were compared. Bone mineral densities of the total proximal femur, distal femur, proximal tibia and spine BMDs were 63.8%, 64.1%, 60.8% and 37.8% lower, respectively, in the SCI twin of TP1 than in the non-SCI twin. In TP2, BMDs at the same sites were 40.5%, 53.4%, 46.9% and 6.7% lower in the SCI twin than in the non-SCI twin. Average thigh and lower leg muscle CSAs were 68.7±3.9 and 69.0±6.7 percent smaller in SCI twins than in non-SCI twins. In the SCI twins, average volumetric BMD at the mid-femur and lower leg sites were 16.6±2.4 and 13.0±3.5 percent less, respectively, than in non-SCI twins. Maximum moments of inertia ( $I_{max}$ ) were reduced in the SCI twins at the mid-femur site when twins of both pairs were compared, being on average 26.0±4.9 percent less than the non-SCI twins. In TP2, lower leg  $I_{max}$  values were 32.4 and 20.3 percent less in the right and left legs of the SCI twin than in the non-SCI twin, but in TP1, lower leg  $I_{max}$  values were only 2.1 and 11.6 percent less, respectively, in the SCI twin. Similarly, bone cross-sectional areas at the mid-femur site were 35.1±2.5 percent less in the SCI twins than the non-SCI twins, whereas at the lower leg site, the differences were larger in TP2 than in TP1. The bone areas of the SCI twin of TP2 were 37.7 and 32.5 percent less at the right and left legs, compared to differences of 11.9 and 16.3 in TP1, respectively. Similar observations were noted for minimum and polar moments of inertia. Muscle atrophy and bone loss are a common consequence of SCI. This study reveals that important changes in bone geometry also occur after SCI. The magnitude of the change may depend on patient-specific variables such as age at injury or bone site measured.



**RE04**

**REHABILITATION FOLLOWING SPACE FLIGHT**

*Michael WC Payne*

**Abstract**

The weightlessness environment of space imposes specific physiological adaptations on healthy astronauts. Upon return to Earth, these adaptations manifest as physical impairments that necessitate a period of rehabilitation. Physiological changes result from unloading in microgravity and highly correlate with those seen in relatively immobile terrestrial patient populations such as spinal cord, geriatric, or deconditioned bed rest patients.

All space agencies are preparing for extended duration missions including colonization of the moon and inter-planetary exploration of Mars. These longer duration flights will result in severe and prolonged disability, potentially beyond the point of safe return to Earth. Major post-flight impairments requiring rehabilitation intervention include orthostatic intolerance, bone demineralization, muscular atrophy, and neurovestibular symptoms. This paper will review these areas and introduce the current NASA rehabilitation plan. Evidence-based rehabilitation interventions are imperative to facilitate return to Earth, but also to extend the safe duration of exposure to a physiologically hostile microgravity environment.



**RR02**

**BOTULINUM TOXIN A VERSUS BUPIVICAINE TRIGGER POINT INJECTIONS FOR THE TREATMENT OF MYOFASCIAL PAIN SYNDROME: A RANDOMISED DOUBLE BLIND CROSSOVER STUDY**

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**Objectives:** To compare the effectiveness of trigger point injections using Botulinum toxin A (BTX A) or 0.5% bupivacaine in combination with a home based exercise program in patients with myofascial pain syndrome.

**Design:** Double blind, randomized crossover trial.

**Setting:** Community physiatry practice.

**Participants:** Eighteen patients with myofascial pain syndrome recruited by family physician or physiatrist.

**Interventions:** Subjects were randomly assigned to receive initial injections of either 25 units of BTX A or 0.5 ml of 0.5% bupivacaine per trigger point. A maximum of 8 trigger points were injected per subject. Subjects were followed until their pain returned to 75% of their pre-injection pain after which there was a 2 week wash-out period. The subjects then had the same trigger points injected with the other agent. All subjects participated in a home exercise program involving static stretches of the affected muscles.

**Main outcome measures:** Magnitude and duration of pain relief, effect on functional ability, satisfaction, and cost.

**Results:** Both treatments were effective in reducing pain when compared to baseline. There was, however, no significant difference between the BTX A and 0.5% bupivacaine groups in duration or magnitude of pain relief, function, satisfaction or cost of care (cost of injectate excluded).

**Conclusions:** Although both BTX A and 0.5% bupivacaine injections were effective, there was no benefit to the use of BTX A over 0.5% bupivacaine in the treatment of myofascial pain.

**Key words:** Myofascial pain syndrome, Botulinum toxin, trigger point injection



**SR01**

**A GLOBAL PERSPECTIVE ON SPINAL CORD INJURY EPIDEMIOLOGY**

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Spinal cord injury (SCI) is a devastating condition often affecting young and healthy individuals around the world. This debilitating condition not only creates enormous physical and emotional cost to individuals but also is a significant financial burden to society at large. This review was undertaken to understand the global impact of SCI on society. We also attempted to summarize the worldwide demographics and preventative strategies for SCI in varying economic and climatic environments and to evaluate how cultural and economic differences affect the etiology of SCI. A PUBMED database search was performed in order to identify clinical epidemiological studies of SCI within the last decade. In addition, World Bank and World Health Organization websites were used to obtain demographics, economics and health statistics of countries of interest. A total of 20 manuscripts were selected from 17 countries. We found that SCI vary in etiology, male to female ratios, age distributions and complications in different countries. Nations with similar economies tend to have similar features and incidences in all the above categories. However, diverse methods of classifying SCI were found, making comparisons difficult.

**Conclusions:** It is imperative that we standardize the categorization and evaluation of SCI. The authors suggest improved methods of reporting in the areas of etiology, neurological classification, and incidence of SCI so that in the future, more useful global comprehensive studies and comparisons can be undertaken. Unified injury prevention programs should be implemented through methods involving the Internet and international organizations, targeting the different etiologies of SCI found in different countries.

**Keyword:** epidemiology, etiology, spinal cord injury, prevention, review



**SR02**

**REVIEW: PLEIOTROPIC EFFECTS OF ANTIPLATELET MEDICATIONS AND THE ROLE OF THE ENDOTHELIUM**

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The antiplatelet drugs, commonly used in the prevention and treatment of cardiovascular disease, possess a number of effects that are independent of direct antiplatelet actions. These effects should be considered pleiotropic because they are unrelated to the specifically-developed action and common use of the drug. Both unexpected beneficial and detrimental effects occur. The endothelium is an important mediator of these non-antiplatelet effects.

A literature search was performed to locate articles related to aspirin, clopidogrel, ticlopidine, and dipyridamole and the interactions of these medications with the endothelium. The role of each of the above medications is explored in relation to vasodilatation, inflammation, oxidation, platelet-leukocyte interactions, and thrombotic tendency via platelet-vessel wall interactions.