

# Abstracts From the 18th Annual Meeting of the Consortium of Multiple Sclerosis Centers

## *The Art and Science of Multiple Sclerosis*

June 2–6, 2004, Toronto

### PLATFORM SESSION ABSTRACTS: CLINICAL CARE AND REHABILITATION

#### (P01) ANALYSIS OF PAIN SYNDROMES DEMONSTRATES CHRONIC AND ACUTE DIVISIONS

Over the past 20 years, pain has been increasingly acknowledged as a significant symptom of multiple sclerosis. Studies have found varying prevalence rates, ranging from as little as 29% to as high as 82% of patients reporting MS-related pain. Moulin has proposed a classification for pain syndromes in multiple sclerosis that includes chronic, acute, and subacute pain. Chronic pain syndromes in MS include dysesthetic extremity pain, while acute pain syndromes include trigeminal neuralgia. Subacute pain syndromes include optic neuritis. The purpose of the present study was to statistically determine whether pain syndromes grouped together by chronicity, location, or mechanism. Sixty-five patients were surveyed at a tertiary care center for multiple sclerosis and over the internet. Patients were asked to complete a questionnaire which asked them to report the type of pain they experienced. Eleven pain syndromes were listed. 83% of the sample reported experiencing more than one type of pain. Principal components analysis of pain syndromes demonstrated two components that accounted for 41.7% of the variance. "Extremity Pain" accounted for 26.6% of the variance and was loaded on by dysesthetic extremity pain, paroxysmal limb pain, spasms, and musculoskeletal pain. "Head and Facial Area Pain" accounted for 15.1% of the variance and was loaded on by trigeminal neuralgia, headache, and optic neuritis. Tonic spasms, iatrogenic pain, secondary pain of MS symptoms, and other MS-related pain did not load on either factor. Results demonstrated that pain syndromes loaded together based on both location and chronicity. These findings partially support Moulin's classification system and demonstrate that MS-related pain can be either chronic or acute. Future research is needed in further establishing a classification system of pain syndromes to benefit treatment planning. The development of a classification system can help clinicians in this venture of the assessment and treatment of MS-related pain.

Study supported by: Gimbel MS Center and CMSC

*Germaine A. Griswold, Frederick W. Foley, Vance Zemon;  
June Halper, W. Crauford Clark, John P. Kuhl*  
Gimbel MS Center, Teaneck, New Jersey USA

#### (P02) COMPARISON OF GOAL SETTING BETWEEN PATIENTS WITH MS AND REHABILITATION CLINICIANS

**Objective:** To determine the concordance between patients with multiple sclerosis and their clinical team members on the identification of goals for an inpatient rehabilitation stay.

**Setting:** An adult inpatient neurospinal unit at a Rehabilitation Centre in Ottawa, Canada.

**Participants:** Twenty-seven patients (11 men and 16 women, mean age of 45.3 years) with either a laboratory or a clinically supported diagnosis of multiple sclerosis.

**Interventions:** Participants rated 55 goals from a pre-existing list on a 0–4 scale, indicating the importance of the goal to be addressed during the inpatient stay. Participants also identified their five most important goals. In a separate session, the clinical team also rated the 55 goals in relation to each participant and identified a list of five most important rehabilitation goals.

**Main Outcome Measures:** Concordance between participant and team ratings in the identification of goals. Ratings of the likelihood of success of achieving each goal and of the amount of change required to make a minimal clinically important difference.

**Results:** The participants and the team agreed on an average of 2 out of 5 of the participants' top-rated goals. Participants considered a greater average improvement would be required for a clinically significant benefit than did the team and also rated likelihood of success in achieving these goals higher.

**Conclusion:** Patients and clinical team members do not necessarily agree on specific goals for a rehabilitation stay. Patients may also have greater expectations than clinicians with respect to the likelihood of achieving goals and of the magnitude of change by discharge.

Study supported by: Labatts Relay Fund of the Institute for Rehabilitation Research and Development

*Lynn F. Bloom, MSW, RS; Nathalie Lapierre, RN, MScN; Keith G. Wilson, PhD; Dorothyann Curran, MHSc candidate; Daniel A. DeForge, MD; Jeff Blackmer, MD, MHSc*  
The Rehabilitation Centre, Ottawa Ontario, Canada

#### (P03) MEASURING PSEUDOBULBAR AFFECT IN MULTIPLE SCLEROSIS

**Background:** Pseudobulbar affect (PBA), manifested by inappropriate tearfulness and laughter, occurs in approximately 10% of MS patients. It can be distinguished from depression by determining the concordance of the patient's behavior with their underlying mood. This distinction can be facilitated through the use of scales. The Center for Neurologic Study Liability Scale (CNS-LS) is a self-report measure consisting of 7 questions; responses are valued from 1 to 5. Currently the CNS-LS is the primary endpoint for an ongoing treatment trial of PBA in MS patients. This study validates the CNS-LS as a research and clinical tool for use in MS patients.

**Design/Methods:** Physician investigators independently rendered a diagnostic opinion regarding the presence or absence of PBA in an outpatient

population of MS patients. After instruction, MS patients completed the CNS-LS as well as a questionnaire that queried patients about the frequency and severity of episodes of PBA. To define a cut-off on the CNS-LS that would best correlate with the physician's diagnosis, a receiver operating curve (ROC) analysis was performed.

**Results:** Of the 90 MS patients completing the survey, 50 patients were diagnosed with PBA by the physician. Mean CNS-LS scores were 22.6 (SD=4.2) for physician-diagnosed PBA patients, and 12.2 (SD = 4.4) for physician diagnosed non-PBA patients. A cut-off score of 17 corresponded to 96% sensitivity and 82.5% specificity. This gave a false positive rate of 12.7% and a false negative rate of 5.7%. Symptoms were greater in patients diagnosed as PBA (mean number of episodes/week (12.4 vs 1.1), number of days/week with episodes (2 vs 0.7), and duration of episodes (8.4 vs 2.2 minutes).

**Conclusions:** The CNS-LS is a valid measure for the assessment of PBA in MS patients. A cut-off of 17 appears optimal for the assessment of MS patients.

*Richard A Smith, MD;<sup>1</sup> James E. Berg;<sup>1</sup> Laura E Pope;<sup>1</sup> Ronald A. Thisted<sup>2</sup>*

<sup>1</sup>Center for Neurologic Study, La Jolla, CA, USA, Avanir Pharmaceuticals

<sup>2</sup>Department of Health Studies, University of Chicago, Chicago, Illinois, USA

#### (P04) PREDICTORS OF VOCATIONAL OUTCOME IN MS REHABILITATION

This study describes profile data for 145 consecutive individuals with MS, coming to the University of Washington MS Rehabilitation Research and Training Center for vocational services over a four-year period. The sample is 69% female, mean age = 43.5 years, approximating 15 years of education, and about 10 years from diagnosis. Comprehensive psychosocial measures were administered at intake, to include the Multidimensional Assessment of Fatigue, the ADL Self-care Scale for MS, the Employment Readiness Scale, the Herth Hope Scale, and other measures relating to depression, anxiety, and coping. An abbreviated neuropsychological battery tailored to MS cognitive concerns (Clemmons, et.al., in press) was also administered. Vocational outcome was established for 90 of the 140 clients both dichotomously (unemployed/employed) at study end and number of months worked half time or more, divided by months available for employment (viz. a monthly employment ratio). Initial analysis involved Spearman correlations of demographic, psychosocial measures, and neuropsychological variables with the monthly employment ratio outcome variable. Initial correlation significant at  $p \leq .05$  includes years of education, ADL Self-care Scale, and several neuropsychological measures (Stroop measures of attention, Trails B, right tactual errors). At  $p \leq .01$ , the Personal Capacities Questionnaire, Trails A (errors), left tactual errors, and a measure of verbal fluency were significant. Further analysis will be presented as to discriminators of consistent employment versus no employment and best predictors of outcome using multivariate analysis. Implications for service delivery are discussed.

*Robert T Fraser, PhD, CRC; David C. Clemmons, PhD, CRC; David Koepnick; Amy Getter, MS; Eric Johnson, MS; Laura Gibbons, PhD*  
University of Washington School of Medicine; Seattle, Washington, USA  
Department of Neurology/Rehabilitation Medicine, Harborview Medical Center

#### (P05) RANDOMIZED CLINICAL TRIAL OF AN ENERGY CONSERVATION COURSE FOR PERSONS WITH MS

This randomized clinical trial evaluated the effects of an energy conservation course (Packer et al, 1995) on fatigue impact and quality of life of persons with MS. Persons with MS (N = 169) were randomly assigned to either an immediate intervention group or a wait-period control group.

The course consisted of six sessions, two-hours/week of energy conservation education taught by occupational therapists in community settings for groups of 8–10 participants. The sessions addressed the importance of rest throughout the day, positive and effective communication, proper body mechanics, ergonomic principles, modification of the environment, setting priorities, activity analysis and modification, and living a balanced lifestyle. The course used lectures, discussions, long-term and short-term goal setting, activity stations, and homework activities to assist participants' integration of energy conservation principles with their performance of everyday tasks. Treatment fidelity was monitored closely. Outcome measures were administered three times over 13 weeks, before and after the intervention and control periods. At the first assessment time, there were no significant differences between the intervention and control groups on age, gender, education level, employment status, type of MS, fatigue severity, or MS Functional Composite scores. Data were analyzed from both an intent-to-treat (i.e., all participants randomly assigned) and efficacy (i.e., compliers only) methods. Results from both methods demonstrated a significant decrease in participants' Fatigue Impact Scale scores immediately after the course in the intervention group when compared to the wait-period control group. Similarly, several sub-scales of the SF-36 Health Survey (quality of life) and Self-Efficacy for Performing Energy Conservation Strategies Assessment improved significantly as a result of the course. These results support the efficacy and effectiveness of the energy conservation course for persons with MS. This is the first randomized controlled trial of energy conservation education for persons with any chronic disease.

Study supported by: National Multiple Sclerosis Society

*Virgil Mathiowetz PhD, OTR/L; Kathy Matuska; Marcia Finlayson*

University of Minnesota Program in Occupational Therapy, Minneapolis, Minnesota, USA

#### (P06) THE EXPERIENCES OF CHILDREN AND ADOLESCENTS LIVING WITH MULTIPLE SCLEROSIS

Because pediatric multiple sclerosis (MS) is uncommon, little is known about the experiences of children and adolescents living with MS. The purpose of this exploratory qualitative study was to learn from the perspectives of these youth what life is like having MS.

**Study Design:** The experiences of children and adolescents with MS were explored using a phenomenological approach. Twelve subjects ages 8 to 18 years participated in an audiotaped interview. A semi-structured interview questionnaire was used to facilitate discussion. A brief demographic questionnaire was also completed. Through narrative analysis, themes and sub-themes were inductively generated then compared and integrated to describe the phenomena of living with MS as a child or adolescent.

**Findings:** The experiences of children and adolescents living with MS are varied but common themes emerged. Initially, they did not know what MS was and many felt scared and/or sad. Over time, they adapted to the temporary or permanent effects. Most described participation in activities typical of their age group. Although they recognized their lives were different because they had MS, they felt the same in many ways and wanted to be viewed as normal. Relationships with family and friends generally stayed the same but most noted some positive and negative changes after diagnosis. Several subjects identified parental worry and over-protectiveness, and being treated differently as stressful. Other stressors included treatment regimens, ongoing symptoms, limitations in activities, and the unpredictability and uncertainty of relapses. Only a few mentioned the potential for future disability. The majority of subjects also described the negative impact of having MS on school performance and attendance. They used diverse coping strategies but all had supportive people in their lives who helped them cope. They expressed the need to move forward

with life and identified hopes and plans for the future. MS was seen as just one part of who they were.

**Conclusions:** The findings of this study provide a greater understanding of the views of youth with MS and offer guidance to improve care.

Study supported by: Biogen Idec Canada

Jennifer Boyd RN, MHSc, CNN(c), MSCN; Lynn MacMillan, RN, CNN(c), MSCN

The Hospital for Sick Children, Division of Neurology, Toronto Ontario, Canada

## PLATFORM: MRI AND DISEASE MODIFYING

### (P07) ACCURACY OF SEGMENTATION WITH DIFFERENT BRAIN ATROPHY TECHNIQUES

**Objective:** To test the accuracy of various segmentation steps obtained with different brain atrophy techniques in patients with relapsing-remitting multiple sclerosis (RRMS).

**Background:** There is no in vivo gold standard to determine the accuracy of segmentation process required to measure whole brain atrophy from brain MRI scans; therefore, phantoms of known volume that are similar in size and shape to a human brain are usually examined to assess the accuracy. However, the accuracy of various segmentation steps throughout the algorithm has not been assessed quantitatively. These segmentation steps include: 1) brain extraction (masking), i.e. the definition of the outer contour of the brain, separation of brain and cerebrospinal fluid (CSF) from extra-axial tissues such as the scalp, skull, orbits, and face; and 2) the segmentation of the intracranial volume into brain parenchyma and CSF.

**Methods:** Brain parenchymal fraction (BPF) was quantified on spin-echo T1-weighted axial sequences obtained by non-gapped 3 mm slices. BPF was calculated by two semiautomated (Buffalo and Trieste) and three automated (SIENAX, Buffalo, and Hybrid SIENAX) software approaches. Accurate ("gold standard") masks of the major segmentation steps were created in 23 patients with RRMS by manual modification of the output files from the semiautomated Buffalo technique, as approved by two experienced observers. Original or inverted versions of the accurate masks were subtracted from the output files of 5 different segmentation algorithms to obtain the following variables: misclassified extra-, misclassified intra-, and missing axial brain volume. All results are expressed in milliliters (ml).

**Results:** There was a significant difference among the five algorithms for misclassified extra-, intra- and missing intra-axial brain volumes, even after Bonferroni correction for multiple comparisons. SIENAX produced 48.1 ml, Trieste 24.9 ml, Buffalo automated 20.2 ml, Hybrid Sienax 17.1 ml and Buffalo semiautomated 16.6 ml (pcorr = 0.01) of misclassified extra-axial brain volume. The figures for misclassified intra and missing axial brain volume (ml) were the following: 37.8 and 106.3 for SIENAX, 29.4 and 82.9 for Hybrid SIENAX, 22.4 and 83.9 for Trieste, 12.5 and 90.7 for Buffalo automated, and 11.3 and 65.6 for Buffalo semiautomated (pcorr = 0.01). However, despite these differences related to segmentation errors, mean and median BPF were not significantly different among the 5 brain atrophy techniques.

**Conclusions.** All the algorithms produced a significant amount of misclassified extra-, intra- and missing axial brain volumes. The SIENAX algorithm produced significantly more extra axial brain volume when compared to any other algorithm.

Robert Zivadinov MD, PhD,<sup>1</sup> Mike J Dwyer,<sup>1</sup> Francesca Bagnato,<sup>3</sup> Kelly L Watts,<sup>1</sup> Laura Locatelli,<sup>2</sup> Sarah B Ludwig,<sup>1</sup> Alessio Bratina,<sup>2</sup> Enrico Millefiorini,<sup>3</sup> Rohit Bakshi<sup>1</sup>

<sup>1</sup>Department of Neurology, The Jacobs Neurological Institute, University at Buffalo, State University of New York, Buffalo, New York USA

<sup>2</sup>Department of Clinical Medicine and Neurology, University of Trieste, Trieste, Italy

<sup>3</sup>Department of Neurological Sciences, University of Rome La Sapienza, Rome, Italy

### (P08) ESTIMATION OF GREY AND WHITE MATTER ATROPHY FROM VARIOUS MRI PULSE SEQUENCES

**Objective:** To determine whether the measurement of whole brain cerebral grey matter (GM) and white matter (WM) fractional volume (FV) is influenced by magnetic resonance imaging (MRI) pulse sequence and segmentation algorithm in patients with relapsing-remitting multiple sclerosis (RRMS) and in normal controls (NC).

**Background:** Using MRI analysis methods, the brain can be divided into GM, WM, and cerebrospinal fluid (CSF) compartments, providing information on the topography of atrophy. The segmentation of GM and WM volumes is usually performed by fully automated algorithms. Recent case-control studies have demonstrated that atrophy affects both GM and WM compartments from earliest stages of MS. It is not clear to what extent segmentation algorithms and pulse sequences affect the measurement of GM vs. WM atrophy in MS.

**Methods:** GM- and WM-FVs were obtained in 25 patients with RRMS (mean disease duration 8.1 years, mean age 42.5 years and mean EDSS 3) and in 17 age- and sex-matched NC. Brain MRI segmentation was performed from 3D SPGR T1-weighted images (WI), 2D-T1-WI, fluid attenuated inversion recovery (FLAIR) images and T2-WI using three different segmentation algorithms: SPM2, SIENAX and Hybrid SIENAX.

**Results:** The GMFV was significantly lower in the MS group vs. NC when measured from 3D SPGR T1-WI with Hybrid SIENAX ( $p=0.013$ ). On the same pulse sequence, the SIENAX algorithm revealed a trend ( $p=0.068$ ), whereas SPM2 did not find a statistically significant difference between the two groups ( $p=0.147$ ). There was no statistically significant difference between MS and NC for the WMFV, measured from all four pulse sequences with all three segmentation algorithms. When the GM- and WM-FVs were compared on the same pulse sequences using the various segmentation algorithms, we found a significant difference for all four sequences ( $p<0.002$  after Bonferroni correction for multiple comparisons). When the GM- and WM-FVs were compared on different pulse sequences using the same segmentation algorithm, we found a significant difference for all three algorithms ( $p<0.01$  after Bonferroni correction for multiple comparisons), except for the GM- and WM-FVs measured with SIENAX on 3D SPGR T1-WI and 2D-T1-WI.

**Conclusions:** MRI estimates of GM- and WM-FVs are dependent on both the type of pulse sequence and the segmentation algorithm. The most optimal pulse sequence in this study for measuring atrophy of GM and WM associated with MS was the 3D SPGR T1-WI.

Robert Zivadinov MD, PhD; Michael G. Dwyer; Kelly L Watts; Sarah B. Ludwig; Rohit Bakshi

Department of Neurology, The Jacobs Neurological Institute, University at Buffalo, State University of New York, Buffalo, New York USA

### (P09) EVOLUTION OF CONFLUENT T2 LESIONS IN RELAPSING-REMITTING MULTIPLE SCLEROSIS

**Objective:** To evaluate whether intravenous methylprednisolone (IVMP) pulses affect the confluence and enlargement of T2 lesions in the long-term in patients with relapsing-remitting multiple sclerosis (RRMS).

**Background:** Some MS studies suggested that IVMP affects early events in lesion formation or lesion propagation, in addition to more transient

beneficial effects on established areas of inflammation and demyelination. In a recently published study, we demonstrated that pulsed IVMP favorably affects events responsible for early pre-enhancing lesion formation in the normal appearing brain tissue and hypothesized that IVMP administration might exert a “surveillance” effect, inhibiting the formation of foci of demyelination and the enlargement of preexisting lesions into macroscopic ones. The present study represents an extended analysis of the MRI measures of disease activity, derived from a previously published phase II clinical trial of IVMP in RRMS.

**Methods:** Of 88 RRMS patients, randomly assigned to regular pulses of IVMP (1 g/day for five days with an oral prednisone taper) or IVMP at the same dose schedule only for relapses and followed-up (without other disease-modifying drug therapy) for 5 years, 81 patients completed the trial as planned. Pulsed IVMP was given every 4 months for 3 years, and every 6 months for the subsequent 2 years. Patients had cranial MRI scans at study entry and after 5 years, and standardized clinical assessments every 4-6 months. Calculations of number, size and lesion volume (LV) of T2 and confluent T2 lesions have been obtained. Confluent T2 lesions were defined as the lesions with size larger than 20 mm in strategically important areas of the brain and/or areas of white matter abnormalities consisting of two or more than two T2 lesions interconnected between them.

**Results:** At study entry, the number, size and LV of T2- and confluent T2-lesions were well matched in the two study arms. Five years after, patients who received IVMP pulses every 4-6 months for 5 years had significantly less confluent T2 lesions (105 vs. 270,  $p < 0.0001$ ), lower confluent T2-LV (5.4 ml vs. 17.4 ml,  $p < 0.00001$ ), less large T2 lesions ( $> 10$  mm) (165 vs. 541,  $p < 0.00001$ ) and lower T2-LV / NB0 T2 lesion index (0.52 vs. 1.1,  $p = 0.007$ ), compared with patients who received IVMP only for relapses. At the end of the follow-up, we demonstrated an inverse relationship between total dose of IVMP and confluent T2-LV in the pulsed MP group ( $r = -0.31$ ,  $p = 0.02$ ). This indicates that patients who received higher total doses of IVMP showed the lowest changes of confluent T2-LV during the study.

**Conclusions:** In patients with RR MS, treatment with pulses of IVMP prevents the confluence and enlargement of T2 lesions. This may have contributed to slow disability progression in the long-term. Further studies are needed to establish the role of pulsed IVMP on lesion recovery and lesion propagation.

Robert Zivadinov MD, PhD;<sup>1</sup> Marino Zorzon, MD;<sup>1</sup> Roberto De Masi, MD;<sup>1</sup> Davide Nasuelli, MD;<sup>1</sup> Giuseppe Cazzato, MD<sup>1</sup>

<sup>1</sup> Department of Clinical Medicine and Neurology, University of Trieste, Trieste, Italy

<sup>2</sup> Department of Neurology, The Jacobs Neurological Institute University at Buffalo, State University of New York; Buffalo, New York USA

### (P10) BRAIN NATRIURETIC PEPTIDE A PREDICTOR OF MITOXANTRONE CARDIOTOXICITY IN MS PATIENTS

**Objective:** To investigate the value of brain natriuretic peptide (BNP) plasma levels as a predictor of early cardiac toxicity during mitoxantrone (MX) therapy in active multiple sclerosis (MS).

**Background:** Mitoxantrone is a synthetic anthracendione approved for the treatment of secondary progressive and worsening relapsing MS. Mitoxantrone is associated with a dose-dependent decreased left ventricular ejection fraction (LVEF). At cumulative doses greater than 100 mg/m<sup>2</sup> an assessment of LVEF is recommended before each dose. However, a decrement in LVEF can be seen at lower cumulative doses. Therefore, new sensitive methods that can predict early cardiac dysfunction are desirable. Plasma BNP was shown to be a sensitive marker in the

diagnosis of decreased ventricular function. BNP levels of  $\geq 38.5$  pg/ml are considered an indicator of early left ventricular dysfunction.

**Methods/Results:** We performed a cross-sectional study on 21 MS patients that received  $\geq 3$  MX treatments (mean = 8). BNP levels varied between 4 and 46 (mean = 20). Two patients who suffered a decline in LVEF to  $\geq 50\%$  had elevated BNP levels (mean = 38.5) even after the return of their MUGA to normal values. We are now prospectively measuring BNP changes at baseline, 10 to 14 days after initial treatment, and before each treatment cycle. MUGA is performed at baseline and after 4 treatments. Our prospective data on repeated BNP levels and their correlation with MUGA measures of LVEF will be available at the time of presentation.

**Conclusion:** BNP could represent a sensitive measure of early subclinical MX induced cardiotoxicity. Further prospective larger studies with ECHO/MUGA correlation testing are underway.

Joan Feichter RN; Eileen Gallagher NP; Terry Justinger RN; Neeta Garg MD; Frederick Munschauer MD; Bianca Weinstock-Guttman MD  
The Jacobs Neurological Institute, Buffalo, New York USA

### (P11) FLUDARABINE ADJUNCT THERAPY IN INTERFERON-TREATED RRMS PATIENTS

**Objective:** To determine safety, tolerability and efficacy of fludarabine (FAMP) rescue in RRMS patients experiencing break through disease while on interferon beta (IFN-b) therapy.

**Background:** Some patients may experience a resurgence in the frequency of clinical relapses while being treated with IFN-b. FAMP, a purine analogue, is cytolytic, pro-apoptotic, and effective against indolent lymphoproliferative disorders and may be effective as adjunct therapy in IFN-b-treated MS patients.

**Design/methods:** Randomized, open-label, 2-arm, phase II clinical trial. Patient eligibility: RRMS, with  $> 2$  exacerbations annually while on IFN-b therapy for  $> 1$  year. All patients received IFN-b1a 30 mcg IM QW throughout study. Multivariate brain MRI analyses: BPE, T2 BOD, T1 lesion load, and contrast enhancing lesions (CEL) performed at baseline and end of study. Standard induction: IV-methylprednisolone (MP) 1 gm QD x 3 days. Randomization: 3 consecutive monthly cycles of FAMP (25 mg/m<sup>2</sup> IV QD x 5 days) or 3 monthly infusions of IV MP (1 gm QD x 1 day). Safety and tolerability were assessed by physical and neurological exams, adverse events, and laboratory assessments. Efficacy was evaluated by exacerbation frequency, modified FS, EDSS, MSFC, MRI, and MP interventions.

**Results:** 20 patients were enrolled and 12 patients completed study thus far. Mean (median) CELs were 1.8 (2) and 1.7 (2), for FAMP and MP groups, respectively. Most common AEs consisted of transient neutropenia or lymphopenia (n=10), transient fatigue (n=4), urinary tract infection (n=1), mild nausea (n=1), and cough (n=1). Interim analyses suggest trends toward improved efficacy of FAMP vs. MP adjunct therapy.

**Conclusions:** FAMP was well tolerated in a cohort of RRMS patients receiving ongoing IFN-b therapy who experienced clinical relapse. Preliminary interim analyses suggest FAMP temporary adjunct therapy may provide fast onset, sustained immunosuppression useful in controlling breakthrough disease, while maintaining patients on immunomodulatory monotherapy.

Study supported by: Biogen Idec, Endowment for the Neurosciences and Berlex.

Steven J. Greenberg MD; Margaret Planter; Margaret Umbauer; Peterkin Lee-Kuen; Norman Glenister; Rohit Bakshi  
Ortho McNeil, Raritan, New Jersey USA

### (P12) SAFETY AND MANAGEMENT OF CAMPATH-1H

## INFUSION REACTIONS IN MS PATIENTS

This is an update of an ongoing Phase II trial of CAMPATH-1H (alemtuzumab) (ILEX Pharmaceuticals, L.P.) in early, active relapsing-remitting multiple sclerosis patients. This study compares 2 dose levels of CAMPATH versus Rebif® (Ares-Serono). CAMPATH is a humanized monoclonal antibody approved as a third-line chemotherapeutic agent in B-CLL. This trial enrolls patients who are treatment naïve for immunomodulatory therapeutics other than steroids. CAMPATH patients are treated with doses of 12 mg/day or 24 mg/day given as a 4-hour IV infusion on 5 consecutive days the beginning of Year 1. A 1-hour IV infusion of methylprednisolone (1 g/day) is given to CAMPATH and Rebif patients on days 1 to 3 (immediately preceding CAMPATH dosing for CAMPATH patients). To date, 179 of 285 patients have been enrolled in this trial, with 117 of them having been treated with CAMPATH (59 at the lower dose; 58 at the higher dose). Preliminary data indicate that infusion-related events are predictable and can be clinically managed. Thus far there has been only 1 SAE in CAMPATH-treated patients. A patient in the higher-dose group developed grade 2 meningitis. The patient was successfully treated with antibiotics and has recovered completely. To date there has been no indication of thyroid abnormalities such as Graves' disease. The preponderance of infusion-related adverse events (NCI CTC) has been mild to moderate, with only 2 reports of grade 3 adverse events, both in the higher-dose group: maculo-papular rash and dyspnea (1 patient each). Both events were clinically managed and quickly resolved. Our experience is that CAMPATH can be safely and conveniently administered to MS patients pretreated with methylprednisolone. Since CAMPATH is given IV, injection site reactions and patient compliance pose no problem. With methylprednisolone premedication and symptomatic treatment of infusion-related events, CAMPATH administration is predictable and manageable.

Study supported by: Ilex Pharmaceuticals, L.P.

Louise E O'Donnell, NP, MS; Brinar V; Vladic A; Gazda SK; Fox E; Bass A; Gonzales G; Wacker B; Norris K; Vukovic V  
Michigan Medical PC West Michigan MS Clinic  
Grand Rapids Michigan, USA

## PLATFORM: PSYCHOSOCIAL ISSUES IN MS

### (P13) A RANDOMIZED CONTROLLED STUDY ON EFFECTIVENESS OF A WELLNESS PROGRAM FOR MS POPULATION

**Objectives:** Multiple sclerosis, the most common demyelinating disease, significantly affects people's quality of life. Traditionally, wellness programs are not implemented to populations with potentially disabling chronic disorders such as MS. The objectives of this study were: 1) to conduct a thorough needs assessment to determine the specific wellness and rehabilitation needs of MS population; 2) to design and implement an innovative wellness program developed according to the needs assessment; and 3) to assess the short and long-term (6 and 12 months post-intervention) effectiveness of the wellness program on the general health and well-being, and quality of life in MS populations.

**Methods:** This randomized controlled trial compared the impact of a wellness program to a traditional rehabilitation (as a gold standard), and to a social activity program (as placebo). Outcome variables were: 1) general health status and well-being, measured by the Short Form-36 (SF-36v2), 2) the quality of life, measured by Quality of Life Inventory (QOLI), and 3) occupational performance, measured by the Occupational Self-Assessment (OSA). Data were collected at pre-intervention,

immediate post-intervention, and one, three, six, and 12 months post-intervention. A multivariate analysis of variance (MANOVA) was conducted.

**Results:** The Wellness Group demonstrated a statistically significant increase in the mental composite score (MCS) of the SF-36v2 ( $p = .032$ ). The Wellness Group also demonstrated a statistically significant positive difference in the environmental impact scale of the OSA over the Traditional Rehabilitation group ( $p = .048$ ) and the Social Activity Group ( $p = .015$ ).

**Discussion:** Strengths and limitations of the study will be discussed. A cost-benefit analysis study will help further determine the feasibility of this type of wellness program for MS population.

**Conclusions:** This study supports the long-term effectiveness of a wellness approach in improving coping skills and qualitative of life for people living with MS.

Study supported by: Multiple Sclerosis Foundation and NSU President Scholarship Award

Jennie Q Lou MD, MSc, OTR,<sup>1</sup> Pierce C.,<sup>2</sup> Classen S.,<sup>3</sup> Hardigan H.,<sup>4</sup> Alvarez J.<sup>5</sup>

<sup>1</sup>Nova Southeastern University, Ft. Lauderdale, Florida USA

<sup>2</sup>Florida International University;

<sup>3</sup>University of Florida;

<sup>4</sup>Southeastern University;

<sup>5</sup>Palm Beach County Health Department

### (P14) BRIEF COUNSELING FOR HEALTH PROMOTION AMONG PERSONS WITH MULTIPLE SCLEROSIS

**Objective:** To determine whether a brief counseling program can improve the health of people with MS.

**Participants:** 105 community-residing people aged 18 or older with EDSS < 6 were randomized, completed the trial, and provided complete data.

**Method:** Participants had a baseline assessment, then those randomized to the treatment group underwent a single motivational interview followed by 5 scheduled telephone counseling sessions. Controls received usual care. Participants chose one target area: exercise promotion, fatigue management, stress management, improving social support or reducing substance abuse. Outcome measures included activity level, self-reported health promotion activities, physical strength, endurance and speed, cognition, subjective health, social support, fatigue impact, and substance use. Preliminary analyses consisted of between-groups t-tests conducted on individual change scores with significance set at  $p < .05$ .

**Results:** 66% chose to exercise, 15% wanted to manage stress better, 10% wanted to improve their social support, 7% wanted to work on fatigue management, and 1% wanted help with substance abuse. The treatment group improved significantly more than the control group on the following measures: self-selected walking speed and most subscales of the Health Promoting Lifestyles Profile II (HPLP II) including the total score, physical activity, spiritual growth, and stress management. Separate analysis of the group that chose to exercise showed that this group improved more than controls on the SF-36 vitality scale, physical fatigue impact, emotional social support, self-selected walking speed and overall activity level. This group also reported greater positive change on the HPLP II total score and physical activity scale.

**Conclusions:** This brief, largely telephone-based intervention resulted in greater improvement on several key health promotion measures compared

Continued on page 64

to controls. Exercise promotion seems especially popular and effective. A previous longitudinal study showed improved health promotion activities may result in less decline in functional ability (Stuifbergen & Becker, 2001).

Study supported by: National Institute on Disability and Rehabilitation Research

*Charles H. Bombardier, PhD; Kimberly Blake; Mary Cunniffe; Rohini Wadhwani; Jennifer Hauge; George Kraft*

University of Washington School of Medicine, Department of Rehabilitation Medicine  
Seattle, Washington, USA

### **(P15) DETERIORATION IN THE HEALTH-RELATED QUALITY OF LIFE OF PERSONS WITH MS: THE POSSIBLE WARNING SIGNS**

**Background:** Researchers have found that health-related quality of life (HRQoL) decreases substantially in the early stages of MS. Knowledge of the factors associated with HRQoL may assist health care providers to recognize the possible warning signs of a deteriorating HRQoL in their patients.

**Objective:** The purpose of this study was to determine the factors associated with the HRQoL of Saskatchewan adults with relapsing-remitting MS.

**Methods:** We used baseline data from a population-based study examining the HRQoL in MS patients about to begin drug treatment to reduce the exacerbation rate. Subjects completed a self-report questionnaire that included questions about demographic and socio-economic status, fatigue, comorbid medical conditions, disability level (EDSS), number of attacks in past six months, and valid and reliable inventories to measure illness intrusiveness (Illness Intrusiveness Scale), depression (Beck Depression Inventory), and HRQoL (SF-36 Health Status Survey). Multiple linear regression models were used to identify the factors associated with the physical and mental health summary scores of the SF-36.

**Results:** We found poorer physical health in those persons who are female; older; not employed full-time; have moderate to severe muscle, joint, or bone problems, or breathing problems; fatigue; higher disability scores; and several attacks in the last six months. High illness intrusiveness; moderate to severe digestive system problems, kidney, bladder, or urinary problems, or headaches were associated with poorer mental health. An interesting and significant interaction between sex and age was found in regards to mental HRQoL, with worse mental health in older men but better mental health in younger women. The mental health of females appears to improve with age, whereas the reverse is true for males.

**Conclusions:** This study provides insight into the factors associated with the HRQoL of relapsing-remitting MS patients. This knowledge may assist health care providers in identifying patients who may be at risk for decline in their HRQoL, permitting appropriate and timely interventions.

*Karen V.L. Turpin RN, BScN; Linda Carroll, PhD; David Cassidy, PhD; Walter Hader, MD*

Department of Public Health Sciences, University of Alberta  
Edmonton, Alberta Canada

### **(P16) EXPERIENCES OF WOMEN WITH MS IN OBTAINING PRIMARY HEALTH CARE AND SCREENING**

Women with MS have reported difficulty in obtaining primary health care and some have reported negative health care experiences. Researchers have reported that women with MS participate less often in health promotion activities than other women. This study explored experiences of

women with MS-related disability in obtaining primary health care and health screening, and their participation in health promoting activities.

A descriptive, comparative study examined efforts by women with MS-related disability to obtain primary health care and screening and their participation in health promotion, and to determine if these differ by level of disability.

Demographics (e.g., age, duration of MS, ambulation status), experiences in obtaining health care, compliance with screening recommendations, and participation in health promotion activities were assessed. Women completed a survey, developed with input from women with MS. Data were analyzed by ANOVA and chi square to compare responses by level of disability.

Women (n = 267) from a random sample of 1000 female clients of a chapter of the MS Society completed mailed questionnaires. The predominantly Caucasian sample (87.4%) was well educated; 65% reported some college. One-third used assistance for ambulation and 20% required a wheelchair or assistance to transfer. Most women (82.0%) reported positive experiences on 13 health care provider behaviors. They were current on health screenings except for fecal occult blood testing (20.7%) and bone density testing (18.7%). Few women (14.9%) reported weight-bearing exercise. Their responses did not differ by disability level.

Women with MS reported positive experiences with health care providers. Few participated in exercise regardless of their level of disability. Compliance with recommendations for colon cancer and osteoporosis screening was low. Thus, greater attention needs to be given by health care providers and by women with MS to health promotion and screening to reduce risk for subsequent health problems, including colon cancer and osteoporosis.

Study supported by: Project grant from Bristol-Myers Squibb Foundation to support Health Promotion for Women with Disabilities Project

*Suzanne C. Smeltzer RN, EdD, MScN; Vanessa Zimmerman*

Villanova University College of Nursing  
Villanova, Pennsylvania USA

### **(P17) HOW INDIVIDUALS WITH MULTIPLE SCLEROSIS COPE**

Multiple sclerosis (MS) is a complex combination of physical, cognitive, behavioral, and emotional symptoms that challenge the coping skills of the individuals and families affected by the illness. Using Parker and Endler's Coping Inventory for Stressful Situations (1990), the purpose of this study was to investigate the coping style of individuals with MS compared to two normative groups (psychiatric inpatients and English-speaking North American adults).

Participants were 207 adults ages 18-69 with MS recruited from a tertiary care center in Northeast Ohio who completed instruments that assessed (a) coping (Coping Inventory for Stressful Situations, CISS) and (b) depression (Beck Depression Inventory-II, BDI II).

Results of T-tests performed to compare the coping styles of individuals with MS to the normative samples suggested that those with MS were less likely to use task-oriented coping and more likely to use emotion-focused coping, distraction, and social diversion. Based upon previous research demonstrating a relationship between depression and coping, additional t-tests were conducted comparing the coping styles of individuals with MS who were not depressed with the normative groups. Results revealed that non-depressed women with MS were less likely to use task-oriented coping and more likely to use distraction and social diversion but no differences were observed in emotion-focused coping. Non-depressed men

with MS did not significantly differ from the normative group on task or emotion-focused coping but reported greater use of distraction and social diversion.

These results suggest differences in the patterns of coping with stress among individuals with MS that may reflect the increased demands of a chronic health condition. Additional explanatory models will also be discussed. Finally, the observed gender difference in coping is consistent with recent research findings suggesting women respond to stress with affiliation (social diversion).

Study supported by: Mellen Center at the Cleveland Clinic Foundation

*Kimberley Schaub, PhD; Peggy Crawford, PhD; Zeeshan Butt, MA*  
Mellen Center at the Cleveland Clinic Foundation  
Cleveland, Ohio USA

### **(P18) SOCIAL SUPPORT FOR MOTHERS WITH MULTIPLE SCLEROSIS AT SEVEN TO NINE MONTHS POSTPARTUM**

**Background:** Changes in everyday functioning following childbirth include the mother's emotional state and social and physical activities that may be even more difficult for mothers with MS who frequently experience relapsing and remitting symptoms that can interfere with their daily functions, suggesting the need for social support.

**Objective:** The objective of this study was to determine the direct and indirect (mediating) effects of MS-related symptoms on ADL functional performance via perceived social support among mothers with MS at 7-9 months postpartum.

**Methods:** This was a descriptive study using a sample of 172 mothers with MS recruited from North America. Mothers completed self-report mailed instruments regarding their experience with MS-related symptoms, perceived social support, and ADL functional performance for the 7-9 month postpartum period. Structural equation modeling was used to test the hypotheses.

**Results:** As hypothesized, MS-related symptoms had a significant negative effect on ADL functional performance and on perceived social support. Also, a significant positive effect of social support on ADL functional performance and an indirect effect between MS-related symptoms and ADL functional performance through perceived social support were observed. Variables in the model explained 86% of the variance in ADL functional performance. The model fit the data satisfactorily with chi square degrees of freedom ratio of 2.47 and Goodness of Fit Index of 0.92.

**Conclusion:** Findings indicated the importance of social support in enhancing ADL functional performance despite the presence of MS-related symptoms. Ongoing social support for mothers with MS beyond the first 6 postpartum months is needed.

Study supported by Rutgers, The State University of New Jersey Research Council

*Elsie E. Gulick PhD, FAAN*  
Rutgers, The State University of New Jersey  
Newark, New Jersey USA

## **POSTERS**

### **(S01) A CASE STUDY OF EARLY ONSET MULTIPLE SCLEROSIS (EOMS) FROM NORTH INDIA**

**Aim:** To characterize earlier onset multiple sclerosis (EOMS) patient (onset before 15 years) and compare with later-onset MS (LOMS; onset after 15 years).

**Methods:** Information was obtained on all patient diagnosed as having MS (clinical or laboratory definitive MS as per Poser's criteria) admitted to a neurology ward between 1994 and 2000.

**Results:** There were 10 patient with EOMS and 35 patient with LOMS. The female-to-male ratio (2:3) was lower in EOMS compared with later onset MS (17:1). The mean age of onset of disease was 8.9 years (2-14 years) in EOMS patients versus 30.6 years (17-70 years) in LOMS. The initial symptoms among EOMS patient were optic neuritis (4/10), sensory symptoms (2/10), motor disturbance, cerebellar dysfunction, pseudotumor like presentation and multiple cranial nerve involvement (1 each) as compared to motor disturbance (10/35) and optic neuritis (28/35) seen commonly with LOMS. A picture like transverse myelitis (5/35) and brain stem involvement (2/35) observed in LOMS was not seen in EOMS group. Interval between first and second episode was less than 1 year in (5/10) of EOMS as compared to LOMS. The differences in the symptomatology observed between the two groups were not significant by Chi-square/Fisher exact test. Fever, nausea, vomiting with CSF pleocytosis and atypical clinical presentation during the first episode was observed in 2/10 patient with EOMS.

**Conclusion:** This is the first analysis of patient with EOMS from India. Atypical presentation with pseudotumor and cranial neuropathy are seen among patient with EOMS and can occur even in those under 10 year of age.

*Achal K Srivastava MBBS, MD, DM; M. Tripathi; M.V. Padma; S. Jain,*  
All India Institute of Medical Sciences  
Department of Neurology, Neurosciences Center  
New Delhi, India

### **(S02) A HEALTH PROFILE OF PEOPLE WITH MULTIPLE SCLEROSIS LIVING IN THE COMMUNITY**

**Objectives:** To provide a detailed health profile of adults with MS by describing their symptoms, estimating levels of motor disability and reporting the health services they have used during the past year.

**Design:** A community-based postal survey using a self-completion questionnaire.

**Participants:** People with a confirmed diagnosis of multiple sclerosis recruited via primary care services.

**Results:** 235 people with MS returned completed questionnaires, a response rate of 51%. Overall, the most commonly reported symptoms were sexual problems, fatigue, urinary problems, and painful muscle spasms. On the basis of the Nottingham Extended Activities of Daily Living (NEADL) scale, 41% of respondents were categorised as mildly, 36% moderately and 23% severely disabled. Whilst the vast majority of respondents reported at least one contact with their general practitioner during the previous 12 months, contacts with other services potentially able to alleviate specific symptoms were surprisingly low.

**Conclusions:** This study confirms that adults with a diagnosis of MS are a diverse group who report a wide range of physical symptoms and psychological challenges. The findings reveal a range of unmet health care