



INTERNATIONAL NEUROTRAUMA Letter

Volume 4 No. 1, 2000-2001

CLINICAL INTERVIEW WITH DR. JEFFREY LEWINE

ZASLER: Dr. Lewine, let's start by just having you discuss, if you would, for the readers some of your background and how you became interested in functional brain imaging and neurophysiological assessment.

LEWINE: Even in my undergraduate years, one of my main interests was brain physiology. I have undergraduate and graduate degrees in Neuroscience from the Center for Brain Research at the University of Rochester. During my training, most of my work focused on examining the relationships between the two hemispheres of the brain. For my post doctoral work, I moved to Los Alamos National Laboratory. At that time, Los Alamos was involved in the development of a new technology, magnetoencephalography [MEG]. MEG was a new strategy for looking at magnetic signals generated by the brain's electrical activity. One of the reasons that Los Alamos was involved was because the actual recording device takes advantage of some very specific principles in low temperature physics. At Los Alamos, I worked on the development of strategies for analyzing MEG data and I began to apply the technology towards more fundamental questions in brain research. In 1992, a large scale biomagnetometer (the unit used to record the magnetic signals) was placed at the Albuquerque Veterans Administration Hospital, so I moved to Albuquerque and started to develop clinical applications for the MEG technology. Areas of major focus include functional mapping of the brain in patients with brain tumors, exploration of epileptic activity in patients with seizures and autistic disorders, and also examination of brain dysfunction in cases of neurotrauma.

ZASLER: Let me ask you this, with regard to some of the terminology which some of our readers at least may not be familiar. Could you differentiate between the terms MEG and MSI please.

LEWINE: MEG stands for Magnetoencephalography and this is basically the magnetic counterpart of electroencephalography [EEG]. What we do in MEG is record the weak magnetic signals that are generated by the brain's electrical activity. MSI stands for magnetic source imaging, which takes MEG to the next step by integrating functional information from MEG with structural information that is derived from magnetic resonance imaging. Through MSI we generate magnetic source localization images which are MRI images that now have plotted on them information about areas of brain activity as determined through MEG.

ZASLER: So, in a sense, MSI is an extension of MEG.

LEWINE: Exactly. It is taking it to the next level and putting the functional information together with structural information.

ZASLER: As far as its application in general cerebral neurotrauma and also in post-traumatic epilepsy, what is currently the state-of-the-art as far as the clinical and research applications of this technology.

LEWINE: Let's start with the state-of-the-art relative to general neurotrauma. At our facility in Salt Lake City, we have a whole-head biomagnetometer unit that actually has 306 sensors that sit above the head. At each instant in time the sensors work to capture the entire pattern of the brain's magnetic activity. This is what the MEG evaluation is all about. In patients with neurotrauma, we typically record 10-20 minutes of ongoing brain activity and we analyze that activity

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ABSTRACTS OF CURRENT LITERATURE

RISK FACTORS FOR THE DEVELOPMENT OF POST-TRAUMATIC CEREBRAL VASOSPASM. AY Zubkov, Al Lewis, FA Raila, et al. *Surgical Neurology* 53(2):126-130, 2000.

Severe brain injury is generally characterized by three phases. The first phase (first 24 hours) is marked by hypoperfusion and cerebral ischemia. The second phase is notable for rebound hyperemia, lasting from 24 to 72 hours. In the third phase, the patient may develop post-traumatic vasospasm (PTV). However, the risk factors for development of vasospasm are not well-defined. The authors studied 90 consecutive patients with brain injury (and good insonations) to determine the risk factors for PTV (including 70 severe TBIs, 16 moderate TBIs, and 4 mild TBIs). Patients were monitored with transcranial Doppler (TCD) ultrasonography. PTV was detected in 36 % of TBI patients, although only those with severe and moderate TBIs. The fifth day marked the onset of PTV and lasted between 1 and 9 days. Twenty-five percent (n=8) of the patients had onset of PTV within the first 3 days following injury. Among patients with PTV, 32% had mild vasospasm, 66% had moderate vasospasm, and 6% had severe PTV. Development of PTV correlated only with severe subarachnoid hemorrhage on initial CT scan. An increased incidence of PTV was identified in patients with epidural hematomas, subdural hematomas and intracerebral hemorrhages.

CULTURAL VARIATIONS IN THE UNDERSTANDING OF TRAUMATIC BRAIN INJURY AND BRAIN INJURY REHABILITATION. G Simpson, R Mohr and A Redman. *Brain Injury* 14(2): 125-140, 2000.

Cultural origin is one of many characteristics that can affect outcome in recovery from traumatic brain injury (TBI). Even though there is a growing body of literature in the health care and disability fields, rehab service providers have little reliable literature which addresses whether patterns of impairments after TBI are consistent across cultures. This report comes from regions in Australia where rehabilitation professionals interact with patients and family members from three different cultural backgrounds: Italian, Lebanese and Vietnamese. Interviews with 64 clients and family members were analyzed using inductive thematic analysis examining three domains: understanding, professional-community interface, and background beliefs such as, cultural practices, religion, and social stigma. Families differed considerably on response to dissatisfaction with service provided. Italian and Lebanese respondents/family members ex-

pressed multiple complaints, such as turnover of staff, lack of access to doctors, lack of sensitivity in imparting "bad news" about prognosis, and feeling as if staff had "done nothing" to help. No complaints were made by Vietnamese. If Vietnamese clients or family members felt they were mistreated, they would go away without expressing complaints. Generally, a positive response to interpreters presence was found among all family members. A common theme was the lack of familiarity with rehab staff despite the use of interpreters. Although family members acted as supplementary interpreters, this frequently created conflict due to mistakes in interpretation and a belief that the family member would not tell the whole truth. One strong theme was the positive way family members were mobilized for support after a relative sustained a TBI. People with TBI from all three cultures experienced problems of stigma and social isolation. Shame was a powerful cultural dynamic with family members lying to friends and other family members about the injury, concealing facts, or minimizing the impact. The authors concluded that there is a universal experience of TBI that transcends individual cultures.

THE INTERNATIONAL NEUROTRAUMA LETTER

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FUNCTIONAL ELECTRICAL STIMULATION-ASSISTED WALKING FOR PERSONS WITH INCOMPLETE SPINAL INJURIES: LONGITUDINAL CHANGES IN MAXIMAL OVERGROUND WALKING SPEED. M Ladouceur and H Barbeau. *Scand J Rehab Med* 32(1): 28-36, 2000. Functional electrical stimulation (FES) was developed more than 30 years ago to prevent "foot drop" in persons with hemiplegia or spinal cord injuries (SCI). Improvements in primary care have resulted in an increase in persons with spinal cord injuries with incomplete motor function loss (SCI-IMFL). FES-assisted walking has been shown to be effective for persons with hemiparesis but has shown minimal effects for persons with SCI-IMFL. Studies of gait modulation with the FES-orthosis turned off showed a therapeutic effect in participants who have had a stroke or brain injury. This study sought to describe the magnitude and time course of changes in maximal overground walking speed (MOWS) resulting from the use of FES-assisted walking for persons with SCI-IMFL. Fourteen patients with SCI-IMFL, average age 33 years, were examined. International Medical Society of Paraplegia (IMSOP) classification was in either the C category (n=5) or the D category (n=14). All participants required an ambulatory assistive device at the onset of the study, such as a walker, forearm crutch or a cane. No changes in MOWS were found in persons evaluated at least three times prior to the start of the FES-assisted walking study. Within the first year of FES-assisted walking, the combined MOWS increased on average by 0.26 m/s ($p=0.0012$) and the therapeutic MOWS increased by 0.25 m/s ($p=0.0003$). Increases in MOWS were not instantaneous, but followed a longitudinal progression. Likewise, increases in therapeutic condition were not instantaneous, but depended on the time since the start of FES-assisted walking. This study showed an average increase in walking speed three times greater than previously reported for persons with SCI-IMFL. It suggests that FES-orthosis has potential as a training tool in the rehabilitation of walking for SCI-IMFL patients, and can be of help in restoring walking behavior.

CORRELATES OF LIFE SATISFACTION AMONG PERSONS WITH SPINAL CORD INJURY. MPJM Dijkers. *Arch Phys Med Rehabil* 80(8): 867-876, 1999. Satisfaction with life or subjective well-being among persons with spinal cord injury (SCI) has been the subject of a number of studies, revealing contradictory findings. This is sometimes due to poor research design, small study numbers, the use of cross-sectional rather than longitudinal designs, or access to only one particular segment of persons with SCI, such as only those with recent

injuries. This study, conducted by one of the eighteen model systems of care in SCI, analyzed 2,348 surveys from the follow-up of persons with SCI. Life satisfaction was measured using the Satisfaction With Life Scale (SWLS), an instrument which measures life satisfaction as a global entity, rather than rating satisfaction on "domains of life." Other instruments included the Craig Handicap Assessment and Reporting Technique (CHART) and the Functional Independent Measure (FIM). Life satisfaction was associated with sex (satisfaction highest in females), rehospitalizations in the previous year, sociocognitive disability (measured by the FIM, and three handicap components: mobility, occupation and social integration). Highest life satisfaction for persons with SCI was found for married persons. Those persons with SCI who resided in a nursing home or long-stay hospital reported the lowest well-being. The effect of impairment was indirect through its impact on motor disability. The data suggest that age has no effect on the SWLS and sex has a very minor effect. Although there were positive beta weights for the FIM sociocognitive component (suggesting the corollary, that cognitive impairment has a negative effect on life satisfaction), no assessment of life satisfaction for persons with both spinal cord and brain injury was conducted.

ELECTRONIC MEMORY AIDS FOR OUTPATIENT BRAIN INJURY: FOLLOW-UP FINDINGS. HJ Kim, DT Burke, MM Dowds, et al. *Brain Injury* 4(2): 187-196, 2000. Microcomputers are emerging as new and potentially useful external memory aids to support prospective memory functioning in persons with brain injury. Recently a number of palmtop computers have been introduced which can provide visual as well as auditory cues. This study reports on an examination of the utility of palmtop computers, programmed with schedule-management software for 12 patients with brain injury (11 patients with TBI and 1 with a history of CVA). Supervised training was conducted twice weekly during regular therapy sessions by a speech or occupational therapist. All patients were independent in self-care and independent in community outings at the time the palmtop computers were introduced. Although 36 patients were initially involved in the trial program, these 12 were followed-up for periods of time between 2 months and 4 years. All patients had at least a high school education. Nine patients (75%) reported at follow-up that the palmtop computer had been useful to them on a daily basis during the supervised trial usage. Two of the three who stopped using their computers had not accepted the need for memory strategies when they were engaged in therapy. Seven reported using the palmtop on a daily ba-

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sis after completion of the supervised trial. Three of these purchased the palmtops with personal funds, while insurers purchased the other four. Two of the seven continued to use an additional memory aid, such as a notebook or calendar, with their palmtop use. Patients characteristics or criteria for application of computer memory aids should be assessed. Two cases are discussed in detail. The authors also stressed that clinical observation indicated that for many of the patients, use of the palmtop computer memory aids resulted in a reduction in anxiety, improvement in confidence and self-esteem, and role performance.

NEW FOUNDATION

The National Brain Injury Research, Treatment and Training Foundation (NBIRTT) has been established to administer non-governmental monies from the National Brain and Spinal Cord Injury Program through the Uniformed Services University for the Health Sciences (USUHS) Department of Defense. The Foundation also receives support from the Irving I., and Felicia F. Rubin Family Research Trust Fund and private donations. These monies are to be used for innovative treatment, training and research programs in the field of brain injury and for technology-based innovative small business start-up grants. A Scientific Advisory Board (SAB) has been established to review all requests for funding. It met for the first time in October to review the first set of proposals. The chairman of this SAB is Peter Patrick, Ph.D., of Charlottesville, VA. The final recommendations for funding are made by the Board of Directors. The elected Chairman of the Board is Cap Mattie also of Charlottesville, VA. The newly appointed Executive Director is Tara L. McDonough of Columbia, MD. She will begin her responsibilities by December 1, 2000. The Foundation will be based out of Columbia, MD for the time being. Correspondence may be sent to NBIRTT, P.O. Box 6422, Columbia, MD 21045-6422. **NTL**

for two types of abnormal patterns. One of those abnormal patterns is something that we refer to as ALFMA — abnormal low frequency magnetic activity. This is large amplitude delta activity in the 1-4 Hertz (cycles per second) range. The other thing that we analyze the data for are epileptiform transients. Both ALFMA and epileptiform activity are considered to be indicative of brain dysfunction. Once the activity is identified, mathematical strategies are used to figure out from where the abnormal signals are generated. The second step of the MSI examination is to have subjects get an MRI evaluation which shows brain anatomy. We then integrate the MEG results with the MRI to define precisely which areas of the brain are demonstrating abnormalities. I think the most exciting aspect of this is that we often find abnormal brain activity in cases of mild head trauma, even when structural imaging is within normal limits. The combined MSI examination reveals those areas of the brain that are focally abnormal and responsible for generating either slow waves [delta activity] or epileptiform transients. It is noteworthy that we sometimes see epileptiform activity even in patients that are without a history of post-traumatic clinical seizures. This activity is nevertheless a sign of brain dysfunction, and for some patients with this type of profile, treatment with antiepileptic drugs can alleviate post-concussive cognitive symptoms. ALFMA is a sensitive measure for brain dysfunction, but it is not a terribly specific measure. We see ALFMA in other disease conditions, including stroke and some of the psychiatric disorders. For the moment, our research focus is on trying to determine if there are specific types of slow waves that will help us predict the course of recovery from head trauma. We are especially interested in seeing if an examination conducted within 5-7 days of a traumatic event can let us predict those individuals who are going to show good cognitive recovery versus those individuals who will show poor recovery. An on-going study (directed by Dr. John Davis, a research fellow in the laboratory) has involved collection of baseline data on all of the football players on the University of Utah football team. We are now tracking these individuals throughout the season, and if any of them get either mild or moderate head trauma, we will re-evaluate them and track them physiologically and behaviorally. Our hope is that this strategy will lead to a method where we will be able to better guide rehabilitative therapy for individuals who have head trauma.

ZASLER: If I understood correctly and this is more for everyone's edification including my own, it sounds like you are using these electrophysiologic markers or looking at them as potential negative prognostic indices of outcome.

LEWINE: That is indeed one of the things we are looking

for, although we also look for positive indices of recovery. We now have some preliminary data that show that, as subjects gets better cognitively, the physiological abnormalities go away. In contrast, if cognitive symptoms persist, physiological abnormalities remain. Again, our real focus at the moment is trying to see if early examinations will allow us to predict longer term outcome.

ZASLER: I think you would agree with me that this is one of the few physiologic markers that have been shown to be at least preliminarily fruitful as a marker that correlates with clinical progress.

LEWINE: Absolutely. Especially in cases of mild trauma where there is not explicit structural damage, MSI shows significant clinical potential. Also, even in some cases where we do see structural damage, MSI may reveal other areas of brain dysfunctioning beyond the site of an obvious structural lesion.

ZASLER: This is exciting because in many cases static neuroimaging is normal and data from other functional techniques such as SPECT and PET fails to correlate well with clinical presentation.

LEWINE: Our preliminary data suggest a good correlation between MSI findings and clinical presentation, but more work is needed in this area. We are now working closely with Dr. Erin Bigler on this issue. Erin is a renowned neuropsychologist here in Utah and we have several collaborative projects where we track both neuropsychological post-concussive symptoms and the MSI signature.

ZASLER: Erin's work has been very interesting in terms of looking at neuropsychological correlates with imaging studies; so I am sure he has a great interest in the work that you are doing. In terms of the clinical treatment implications, are we too early in the ballgame to say just how helpful, if helpful at all, this technology will be in directing clinical care.

LEWINE: I think it is still very early in the game. The exception to that is in patients where we identify epileptiform activity. Even if there is no clinical seizure disorder present, treating the epileptiform activity with anticonvulsants may be warranted, although this must be coordinated through a medical doctor. In terms of the low frequency activity, we have had a few cases where we have seen this abnormality in individuals who have had postconcussive attention deficits. The combination of the psychological data with the neuroimaging data has led the treating physician to try things like methylphenidate [Ritalin] with these patients, often to their benefit. The data look promising, but I think we are still very early on in this research.

ZASLER: Let's back up and talk about, if I may, the patient population that you are finding the changes that are consistent in your opinion with underlying epileptic foci

where prior diagnostics have not shown that. Are you specifically stating that prior EEG testing may not show what MEG does?

LEWINE: There are some cases where MEG will show epileptic spikes not seen on routine clinical EEG. This relates to issues in terms of spatial sensitivity of the two methods and, in particular, selectivity relative to the orientation of dendrites within the brain. EEG is most sensitive to cell populations that have their dendrites perpendicular to the skull surface, whereas MEG is most sensitive to some populations with dendrites parallel to the skull surface. What we typically do at our facility is that we do EEG and MEG examinations together in order to capture the entire cortical mantle.

ZASLER: I don't know what the total number of subjects is in your postconcussive population, but if you can share with us a little bit about this in terms of what percent of subjects show ALFMA or epileptiform activity.

LEWINE: In terms of the epileptiform activity, that tends to be seen more in the moderate trauma group than the mild trauma group. Our total number of subjects at this point is still relatively small, with only about 25 subjects with moderate head trauma. We see epileptiform type of activity in about 40% of these individuals and for these, in about 30% the activity is much more clear on an MEG evaluation than it is on an EEG evaluation. But, at this point, the numbers really are still quite small.

ZASLER: Before completing your answer, let me make two comments. The moderate group that you mentioned - that did not include individuals with mild TBI, just moderate TBIs, correct?

LEWINE: That is correct.

ZASLER: And then you have another group of subjects that had mild TBI that you have also found some, but to a lesser extent, positive on MEG for epilepsy.

LEWINE: Right. That group tends to have mostly slow wave activity (seen in about 60%), but between 15-20% of the group also shows some epileptiform activity.

ZASLER: Again, I don't know your own familiarity with the epilepsy literature and traumatic brain injury, but those numbers are certainly much higher than most clinicians who work in this field would have guessed. If anyone was asked and certainly I think that most people would tell you 2-5% at a max is the upper end for mild as far as incidents of clinical epilepsy and probably 20% or less for moderate traumatic brain injury, assuming we are referring to nonpenetrating brain injury. Are we necessarily making any assumptions here about whether

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these are transient types of phenomena versus permanent "post-traumatic epilepsy"?

LEWINE: Well again, let me make a distinction between clinical epilepsy with convulsive seizures and epileptiform activity in the brain. One can have epileptiform activity in the absence of clinical seizures, and the clinical import of such activity is presently debated. In our population, like that of others, clinical seizures are rare, especially in the mild trauma group. Nevertheless, we see epileptiform transients in a much higher percentage of the population. There is always a question in these populations as to how much of this is potentially something that was present prior to the injury but our data suggest that this number is low. On the other hand, the full clinical significance of epileptiform transients without seizures is not certain.

ZASLER: Right. That is what I was going to ask; so we don't know whether this even necessarily translates to "sub-clinical epilepsy" as far as what the threshold issues are with MEG or labeling something as consistent with an underlying epileptic disorder.

LEWINE: That is correct. At this point in time, our numbers are not large enough for us to really know what is the full clinical significance of seeing this activity. Again, we certainly have individual cases where the impression has been that the observed epileptiform activity was clinically significant and in some cases our clinical colleagues treated this activity. In several cases, but not in all cases, treatment with antiepileptic drugs led to improvements in cognitive abilities. So it is clear that there are some persons who will show epileptiform activity post trauma, but for them, the epileptiform activity is not really clinically significant. The trick for the future will be distinguishing groups with meaningful versus non-meaningful activity.

ZASLER: I might also bring up the point that I think you have already alluded to about the specificity of the technique relative to other clinical conditions such as post traumatic stress disorder and depression.

LEWINE: The whole issue of specificity is a critical one and one that we are just starting to get a handle on. Again, we know that conditions like ischemic disease will produce slowing that is presently indistinguishable from the low frequency activity we see in head trauma. So, while MSI and MEG are providing objective evidence that there is something dysfunctional in the brain; one still needs historical information, clinical information, and psychological infor-

mation on individual subjects before one can really relate the MSI findings to a specific episode of head trauma.

ZASLER: So although this may turn out in the future to be something that gives us additional information, I guess what I am hearing is, we still don't expect this to be the diagnostic panacea for stating whether someone did or did not or does or does not have sequella of brain injury.

LEWINE: Well, again I think we can state that it is useful for providing objective evidence that the brain is dysfunctional, but relating this dysfunction specifically back to head trauma is presently very difficult.

ZASLER: Let's back up. Maybe I should ask the question differently: Specific to brain injury due to a particular traumatic event in time.

LEWINE: Right, and at this point, except in an individual where we fortuitously have baseline data, we can't make a definitive link between our findings and a specific traumatic event. One of the exciting aspects of this football study that I mentioned is the collection of baseline data, so we will know when slowing is showing up as a result of head trauma. There

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JOURNAL UPDATE COLUMN

The following column will appear periodically in the *International NeuroTrauma Letter* to familiarize readers with relevant journals germane to working with persons with neurotrauma following acquired brain and/or spinal cord injury.

The Journal of Neuropsychiatry and Clinical Neuroscience

Published since: 1989


Frequency of Publication: Quarterly

Publisher: American Psychiatric Press, Inc.

1400 K Street, NW

Washington, DC 20005

Tel. Number (202) 682-6262

GENERAL COMMENTS: This is an excellent journal for anyone working with individuals with neuropsychiatric impairments secondary to neurotrauma and other disorders. The journal is typically divided into regular sections including special review articles, editorials, original scientific research, clinical reports, neuropsychiatric practice, as well as, opinion and clinic abstracts. There are also regular book reviews and letters to the editor. This is an excellent peer reviewed journal for anyone interested in the behavioral sciences. 

BOOK REVIEW

The Oxford Handbook of Memory.

Endel Tulving and Fergus IM Clark, Editors.

Oxford University Press, 2000.

ISBN 0-19-512265-8

700 pgs.

Review by Linda L. Thoi, DrPH

The Oxford Handbook of Memory has assembled a summary of the current state of the science of memory. Although, no single volume could adequately address the subject of memory, *The Oxford Handbook* selectively deals with memory from the perspectives of cognitive neuroscience, neuropsychology, and experimental, cognitive and developmental psychology. By thus restricting this sphere, the editors were able to cover the major theories, findings, and methods that are current in the behavioral and cognitive fields of memory science.

Part I of *The Oxford Handbook* introduces the reader to basic presuppositions, concepts and methods in a historical context. The authors point out that many early theories and models were outgrowths of the researcher's experience with patients, such as the short-term memory (STM) models, which were partly inspired by patients with organic amnesia caused by bilateral damage to the medial temporal lobe and hippocampus. These patients have intact short-term and long-term memory, but are impaired when it comes to transferring new verbal information to long-term memory.

Part II delves into the laboratory research that has formed the core of present day major hypotheses, methods, and conclusions. This research is from the perspective of behavior, emphasizing the roles of conscious awareness and reflection. Of particular value in understanding the various and unique characteristics of memory are chapters: *Short-Term and Working Memory*, *Encoding and Retrieval of Information*, *Serial Learning: Cognition and Behavior*, *Remembering Actions and Words*, *Distortions of Memory*, *Remembering and Knowing*, and *Nonconscious Forms of Human Memory*.

If the preceding chapters are the "bones" or foundation, then Part III is the "meat" of this text. In the initial chapters, the authors discuss memory development from infancy and early childhood. The chap-

ter on *Socialization of Memory* continues the development of memory functioning as a result of socialization practices from early childhood into adult years. Five chapters make up the section on Memory in Use (for the adult), including two exceptional jewels: *Remembering Life Experiences* and *Memory for Emotional Events*. Finally, the section concludes with Memory in Decline, discussing memory changes in the healthy older adult, the aging brain, selective memory disorders and the dementias. The final section links memory to brain mechanisms, with chapters on the *Neuroanatomy of Memory* and *The Medial Temporal Lobe and the Hippocampus*. Another essential section, often lacking from other texts on memory, is the outstanding presentation of PET and fMRI studies of long-term and working memory. Theories of Memory, a series of six chapters, concludes the section, describing various working models and theories of memory and consciousness.

The editors were quick to note that although there have been many other books which address memory, this is essentially the first handbook of memory ever published. In the 60s, many researchers in memory science (then called "learning" research) were as famous for their eccentricities as they were for their science. On failing to find a forum for their results, they resorted to publishing their own findings in memorable classic publications such as *The Worm Runners Digest*. Now, it seems memory science has come of age.

The *Oxford Handbook of Memory* presents an outstanding collection of history, expertise, knowledge and experience in the field. It literally defines the current state of the science of memory. Although published this year, it is already defining its place as a major reference source. We recommend *The Oxford Handbook of Memory* for people already in the field of memory science, those who deal with memory impairment from behavioral or cognitive aspects, or those who want to enter the field of memory science. **NTL**

Interview with Dr. Lewine, continued from page 6

may be aspects of the slowing that really are head trauma specific, but at this stage of study we don't know what those are.

ZASLER: Any parting comments. Certainly, this is an exciting area and one where we don't have too many people out there aside from yourselves at your institution currently working on MEG, MSI, and in particular there is a paucity in the neurotrauma population; so I want to congratulate you on your work and I look forward to seeing more, but, any sense of where you're headed both in terms of where you would like to head and where you envision that you are headed?

LEWINE: Yes, I think the main thing that we have started to do at our facility is to do what we refer to as multimodal imaging in combination with neuropsychological testing. In as much as I would like to hope that MEG, by itself, is going to be this diagnostic magic tool for head trauma, my guess is that it is not. Rather, it may be that a combination of MEG, MRI, and SPECT will provide the definitive profile of traumatic brain injury. Another exciting method to explore is MR spectroscopy which looks at brain biochemistry. I believe that it will be the combination of techniques that will help us to identify neurobiological findings that really are very specific and definitive for traumatic brain injury.

ZASLER: Great, I very much appreciate your time and the fact that you have shared some up-to-the-minute knowledge with us regarding your work, as I am sure the readers of the *International NeuroTrauma Letter* appreciate it as well.

LEWINE: I really appreciate the opportunity. Thank you.

Interview conducted by Nathan D. Zasler, M.D.

Dr. Lewine completed his doctoral degree in Neuroscience at the University of Rochester, where he was a member of the Department of Physiology and the Centers for Brain Research and Visual Science. In 1989 he was appointed a Directors Fellow at Los Alamos National Laboratory where he worked on the development of magnetoencephalography. In 1992 he was appointed the Director of the Magnetic Source Imaging and Neuroscience Divisions of the New Mexico Institute of Neuroimaging. At present, Dr. Lewine is the Scientific Director of the Center for Advanced Medical Technologies, Scientific Director of the Learning Abilities and Resources Program, Director of the Functional Brain Imaging Program and Director of the Magnetic Source Imaging Facility at the University of Utah. He is also an associate professor of both Radiology and Psychology. Dr. Lewine is the author of more than 60 scientific publications and he has held fellowships from both the McDonnell-Pew program in cognitive neuroscience and the National Alliance for Research on Schizophrenia and Depression. He is internationally recognized as an authority on the clinical applications of magnetoencephalography, with a focus on brain imaging in epilepsy, head trauma, and developmental disorders. Tel: (801) 585-5818, Fax: (801) 581-3222. E-mail: lewine@doug.med.utah.edu.

NIL

International Conferences and Meetings

YEAR 2001

February

February 4-6 — 4th National Symposium & The First Regional Meeting for the International Society of Physical & Rehabilitative Medicine, Riyadh, Saudi Arabia. Contact PO Box 16084, Riyadh, 11464, Kingdom of Saudi Arabia; email: rehab2001rkh@yahoo.com.

March

March 3 - 4 — Trauma 2001, A Joint Meeting of the Australasian Trauma Society and the Trauma Society and the Trauma Association of Canada, Sydney Convention and Exhibition Centre, Darling Harbour NSW, Australia. Contact Secretariat at email: contact@conferenceaction.com.au or phone: +61-2-9956 8333.

May

May 5 - 9 — 4th World Congress on Brain Injury: Research Innovations and Quality of Life for the New Millennium, Ligotto Conference Centre, Turin, Italy, sponsored by the International Brain Injury Association (IBIA). Contact Stilema by phone at +39.011.53 00 66 or see IBIA's website: <http://www.internationalbrain.org>.

June

June 17-21 — 17th World Congress of Neurology, London, England. Contact WCN 2001, Concorde Services Limited. By email: wcn@concorde-uk.com or phone (44) 0 181 743 3106.

July

July 7-13 — 1st World Congress of the International Society of Physical and Rehabilitation Medicine. Contact Congress Secretariat Eurocongress Conference Management, Jan van Goyenkade II, 1075 HP Amsterdam, The Netherlands; email: eurocongres@rai.nl

July 28-31 — Brain Injury Association's 20th Annual Symposium, Sheraton Atlanta Hotel, Atlanta, Georgia, USA. For more information, contact Elizabeth Rouse (703) 236-6000, ext. 104 or see BIA's website: www.biausa.org.

August

August 26-31 — Joint Meeting of the International Society of Neurochemistry (ISN) and American Society of Neurochemistry (ASN), Buenos Aires, Argentina. Contact SA Moreno, Congresos Internacionales, Argentina by email: conginte@congresos.com.ar or fax 54-11-4331-0223.

September

September 9-14 — 23rd International Congress of Pediatrics, Beijing, China. Contact: Dept. Foreign Relations, Chinese Medical Association, Beijing by phone at +86-10-6525-0394 or fax +86-10-6512-3754.

September 13-16 — 4th Congress of the European Paediatric Neurology Congress, Baden-Baden, Germany. Contact Prof. Dr. Dr.h.c. F Hanefeld, Georg-August-Universität by email: hanefeld@med.uni-goettingen.de or phone +49-551 398035.

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September, 20-25 — 9th International Child Neurology Congress, Beijing, China. Contact: Jiang Yu-Wu, M.D., Local Organizing Committee, Pediatrics, 1st Hosp., Beijing Med Univ by email: jiangyw@bj.col.com.cn or fax: (86010) 66176450.