

M INSIDE Moss Rehab

News, research and best practices from one of the nation's leading rehab providers

FALL 2008

Nationwide Zolpidem Study Now Underway at Moss Rehabilitation Research Institute

After completing a pioneering study on vegetative patients' response to the drug zolpidem (known as Ambien, but now available generically) researchers at Moss Rehabilitation Research Institute (MRRI) are embarking on a three-year, nationwide examination of how and why the drug has such a dramatic effect on some patients but not others.

Case reports of the rousing effect of zolpidem on vegetative and minimally conscious patients have appeared sporadically in the literature. The reports tell of patients who, after being vegetative for several years, suddenly regain consciousness for a period of hours shortly after receiving the drug. Their reactions have ranged from eye and body movement in response to external stimuli, to actual speech.

John Whyte, MD, PhD, director of MRRI, was intrigued by these findings but mindful of the publication bias inherent in case reports. In response, he designed a study that would determine the likelihood of a vegetative patient responding to zolpidem. In 2007, he and his colleague Robin Myers, PT, NCS, administered zolpidem to 15 vegetative and minimally conscious patients. Of these, one patient showed a dramatic temporary improvement consistent with the published case reports.

"He followed a number of commands very clearly to move his arm, move his leg, and wave goodbye. And he followed people with his eyes as they walked around the room, none of which he did off the drug," Dr. Whyte said.

Zolpidem did not cause this patient to regain speech, but it did produce the greatest improvement in his condition since he had become vegetative four years earlier. The researchers' next step was to establish why he responded to the drug while the others did not.

"Was it the case that this drug worked for some patients and didn't work for other patients? Or maybe it worked for everyone, but the response was dependent on the amount of brain that was not irrevocably damaged," Dr. Whyte said.

What Makes a Responder?

To answer this question, the researchers analyzed the behavior of the 14 non-responding patients while they were on zolpidem versus placebo. The patients showed no trend toward better performance on the zolpidem day—the drug was simply not affecting them.

"It's looking like it's a yes or no reaction. You're either a responder or you're not a responder," Dr. Whyte said, "as opposed to being big responder, medium responder or small responder."

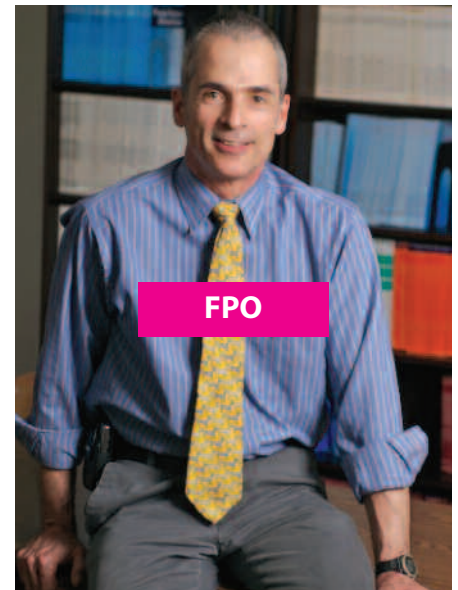
Zolpidem's exact mechanism of action in the brains of vegetative patients is still unknown, but Dr. Whyte sees a potential explanation in the drug's similarities to benzodiazepines.

"This class of drug inhibits certain populations of neurons. What we have to assume is that this drug is inhibiting some neurons that in turn are inhibiting the function of some viable parts of the brain. But we don't know where or exactly how that's happening," he said.

Dr. Whyte presented his findings earlier this year at the Seventh World Congress on Brain Injury of the International Brain Injury Association in Lisbon, Portugal. His study is also under review for publication in the *American Journal of Physical Medicine & Rehabilitation*.

Dr. Whyte now wants to pull together a group of responding patients and clinically similar non-responders to further identify the causes behind the zolpidem reaction.

"If there's a part of the brain that's critical for allowing this drug to work, that implies that part of the brain has the ability to allow a person who appears vegetative to regain consciousness and start functioning again," he said. "There's a lot of research we might want to do about that part of the brain, and about many other treatments that might improve its functioning."



John Whyte, MD, PhD

continued on page 5

A Hospital within a Hospital: MossRehab Benefits from Einstein at Elkins Park

Not many physiatrists outside Pennsylvania know that MossRehab shares its 60-acre suburban campus with a full-service acute-care hospital. Yet the relationship between these two entities, both part of Albert Einstein Healthcare Network (AEHN), makes MossRehab one of the most unique rehab providers in the country and provides the basis for its continued level of national excellence.

For nearly 100 years, MossRehab's flagship facility had been located on the campus of Albert Einstein Medical Center, a large acute-care academic hospital in North Philadelphia. By 2004, it had become obvious that MossRehab's patient base was quickly outgrowing the space. When a small community hospital only four miles away was offered for sale later that year, MossRehab purchased the building and transferred 130 of its beds to the new location.

The newly purchased facility was a for-profit acute-care hospital with 160 acute-care beds, an Emergency Department, operating suites and full-service ancillary departments, including an onsite laboratory and radiology services. Under the direction of AEHN, the building was transformed to a 130-bed rehabilitation facility with an imbedded acute-care hospital. The arrangement between MossRehab, which occupies the majority of the building, and the imbedded hospital, now called Einstein at Elkins Park, is highly unique. Whereas almost every rehabilitation facility in the country is either imbedded within a larger acute-care hospital or operates as a freestanding facility, MossRehab is a large, complex rehabilitation provider that encompasses a full-service acute-care hospital.

MossRehab holds the majority of licensed beds in the building—currently 130 of 196 total—which allows for a high degree of specialization and the dedicated space and resources consistent with a freestanding rehab facility. For example, 32 beds are reserved for stroke patients alone, as are a team of specialized physicians, therapists and speech pathologists who work exclusively with stroke survivors. Other diagnoses, such as traumatic brain injury, amputation, or spinal cord injury, are all serviced

by dedicated care teams. “Such specialization would not be possible if MossRehab were a small rehab unit located within a larger hospital,” said Alberto Esquenazi, MD, MossRehab's Chief Medical Officer. “We offer our patients the best of both worlds: the supporting services of an acute-care hospital combined with the specialization and expertise of a large, freestanding tertiary rehabilitation provider,” he said.



Acute-Care Support Available Onsite

Patients who develop complications at freestanding rehab facilities are often transferred via ambulance to an acute-care hospital for treatment. In contrast, patients who develop a complication at MossRehab remain on the premises and are simply transferred to an acute-care unit within the same building. Physiatrists remain active in their patient's treatment. Some patients with medical issues are even able to remain in a MossRehab bed because of the close proximity of ancillary and other services.

“Our patients and their families avoid the anxiety of an ambulance trip and remain in the environment to which they've grown accustomed, which has improved our patient satisfaction scores,” Dr. Esquenazi said. “The transition to acute care happens with the push of an elevator button. On the next floor, the acute-care services provide all the backup for a cardiac, pulmonary or infectious process, or changes in neurological status. And at the same time, the physiatrist maintains close supervision of the rehabilitation staff on the acute care side, helping guide the decision on when to return to the rehabilitation program.”

Infusing the Rehab Philosophy

Dr. Esquenazi added that MossRehab's majority presence on the campus has helped bridge the cultural gap between acute care and rehabilitation, creating a unique environment in which rehabilitation has become a major focus for the institution as a whole. “In acute care, the expectation is that you'll be cured, whereas in a rehabilitation hospital, the expectation is that you'll make the best use of your abilities to function. We've been able to infuse that rehabilitation philosophy through the whole building in a meaningful way,” he said. MossRehab discharges 15 percent of its patients into acute care, and Dr. Esquenazi has observed a remarkable level of adoption of rehabilitation techniques and approaches by the acute-care staff. “If a stroke patient is sent to acute care because he had a neurological change, the acute-care staff will be thinking from a neurological and rehabilitation perspective,” he said. “They will be aware the patient has had a stroke before, and will look at all the issues that are important in the rehabilitation process.”



CASE STUDIES

Harry Schwartz, MD, Physiatrist, MossRehab



“A patient of mine was admitted to MossRehab as a transfer from an outside hospital. The diagnosis was incomplete paraplegia due to a thoracic spinal cord mass. She had an operation at the referring hospital. During her rehabilitation stay, she accidentally choked on a piece of food during her breakfast. She lost consciousness and was given the Heimlich maneuver by a nurse and successfully managed by the hospital's code blue team. Upon resuscitation she had a very fast heart rate; this was due to the temporary low oxygen content of her blood during the choking episode. She was transferred to the Einstein at Elkins Park Emergency Department and then admitted to the telemetry unit for observation and cardiac evaluation. After being deemed stable by the cardiology team in the PCU, she was readmitted to the MossRehab Spinal Cord Program three days following this episode. The presence of emergency and critical care services in the same building as the rehabilitation units was crucial in this patient's survival and recovery.”

Jeanne Pelensky, MD, Physiatrist, MossRehab



“I recently had a patient with traumatic brain injury who went to the Einstein at Elkins Park Emergency Department (ED) because of decreased responsiveness and possible cardiac issues. He had multiple medical co-morbidities that needed to be considered in the evaluation and our ability to directly discuss the case with the ED staff was of great utility to that department. Evaluation was accomplished in the ED, including MRI scanning and a cardiology consult. As a result, the patient could be safely returned to the rehabilitation unit a few hours later. In the absence of this unique onsite capability for rapid medical evaluation and treatment, the patient would have had to be transferred via ambulance to another ED, and likely admitted for further work-up as the hospital's staff would not have had familiarity with the patient. This would have caused a significant disruption of the patient's rehab course.”

The acute-care facilities have been redesigned with the needs of rehabilitation patients in mind. Office counters are low enough for patients in wheelchairs to interact with staff face-to-face. Waiting rooms and bathrooms are spacious and wheelchair accessible, and the exam tables in every physician's office can be mechanically raised and lowered to accommodate disabled patients. Valet parking is complimentary, and the major ambulatory services—PM&R, neurology, orthopedics and outpatient therapy—are all located on the ground floor for easy access.

Surgery Suite & ED Benefit Patients

For rehab patients undergoing surgery or other invasive procedures, several onsite operating suites provide the necessary equipment and specialized staff to ensure successful outcomes. Michael Saulino, MD, director of the intrathecal medication program at MossRehab, has run successful trials of intrathecal drugs despite the added difficulty of implanting catheters into his patients' spines, which are often deformed due to scoliosis or traumatic injury. “We have not only the imaging techniques to guide the catheter placement, but we also have a whole staff that serves as a backup to any complication that can arise,” he said.



Finally, the presence of an onsite 24-hour Emergency Department provides an extra level of safety for MossRehab's patients. Rehab patients who develop a critical condition, such as sudden respiratory distress, are quickly and expertly intubated. A patient with dysphagia who starts to choke will be treated by a physician specialized in emergency medicine. “In a very stressful situation, an ER physician—not a resident or generalist—arrives in less than a minute and begins a life-saving procedure. Having an Emergency Department onsite has given us a higher level of access to expert acute emergent care,” Dr. Esquenazi said.

Having an acute-care hospital imbedded within MossRehab provides benefits for its patients every day. The case studies at right demonstrate this valuable relationship in action.

Scholarly Update

Each year, the members of the Moss Rehabilitation Research Institute and many of our other physiatrists publish several articles in leading academic journals. A few of this year's prominent papers include:

Buxbaum, LJ, Palermo, M, Mastrogianni, D, Schmidt, M, Rosenberg-Pitonyak, E, Jax, SA, Coslett, HB. Assessment of spatial attention and neglect with a virtual wheelchair navigation task. *Journal of Clinical and Experimental Neuropsychology*, 30(6), 650-660, 2008.

Esquenazi A, Mayer N, Garreta R. Influence of botulinum toxin type A treatment of elbow flexor spasticity on hemiparetic gait. *Am J Phys Med Rehabil*. 2008 Apr;87(4):305-10; quiz 311, 329.

Jax, S. A., & Rosenbaum, D. A. (2008). Hand path priming in manual obstacle avoidance: Rapid decay of dorsal stream information. *Neuropsychologia*.

Mayer N, Esquenazi A: Skin and Musculoskeletal Consequences of the Upper Motoneuron Syndrome. In: Botulinum Toxin: Therapeutic Clinical Practice and Science. Jankovic et al (eds) . Elsevier. In Press.

Whyte J, Vaccaro M, Grieb-Neff P, Hart T, Polansky M, Coslett HB. The effects of bromocriptine on attention deficits after traumatic brain injury: A placebo controlled pilot study. *American Journal of Physical Medicine and Rehabilitation*, 87:85-99, 2008.

For more of MossRehab's scholarly activities, visit www.insidemossrehab.org.

MossRehab's Lokomat Robot Improves Walking Ability

MossRehab's recent acquisition of the Lokomat—a robotic training assistant consisting of an exoskeleton mounted above a treadmill—will greatly enhance the process of helping patients relearn how to walk.

The Lokomat's exoskeleton, pictured here, wraps around a patient's hips, knees, and lower back. Through a computer, it can be programmed to perform precise walking patterns. These repetitive patterns may train the brain and spinal cord to develop alternative pathways to support mobility after injury or illness.

Prior to the Lokomat, patients were assisted by two or more physical therapists who manually moved their legs in a walking pattern. However, this labor-intensive process did not allow for the precise repetition of specified movements over an extended period. Compared to therapist-assisted rehabilitation, the Lokomat allows the patient to walk in a consistent manner and speed for a much longer period of time, resulting in significantly more movement repetitions.

The Lokomat also gives patients the opportunity to engage in weight-bearing exercise, which helps strengthen muscles and reduces the risk of osteoporosis due to immobility. To derive the maximum benefit from the Lokomat device, a patient must experience sensation or have movement in at least one major muscle group in the leg.

"The Lokomat was developed primarily for treating patients with spinal cord injury," said Alberto Esquenazi, MD, director of the Gait and Motion Analysis Laboratory and Regional Amputee Center. "There are less than 100 centers in the world using this technology, and we're the first in our region. We'll be investigating a newer use of this technology to assist patients after stroke or traumatic brain injury."

After stroke or traumatic brain injury, patients may have difficulty with symmetrical motion, being weaker on one side. Because the Lokomat can be programmed so precisely, patients can be encouraged to walk in a symmetrical fashion, with assistance or resistance applied as needed to strengthen weakened muscles. The team at MossRehab has developed and will submit a research proposal to determine the effect of Lokomat therapy in patients with TBI.

MossRehab at Leading Edge in Research and Therapy

According to Dr. Esquenazi, the significant investment in the purchase of the Lokomat, and the days spent training staff, are reflections of MossRehab's commitment to development and implementation of new tools for rehabilitation, which has earned

the facility the distinction of being one of *U.S. News & World Report's* Best Hospitals for 15 years. "Ultimately, we want to offer patients the broadest range of cutting-edge therapies to enhance their independence and quality of life after stroke or traumatic brain injury," he said.

MossRehab, which has extensive experience researching neurologic conditions and traumatic brain injury, treats the largest number of stroke patients in the Delaware Valley and is the largest recipient of research grants in the area of traumatic brain injury in the mid-Atlantic region. Moss has the advantage of being the only facility in the area that combines a comprehensive specialized tertiary rehabilitation facility with an acute-care hospital to better serve the needs of its patients.



Dr. Esquenazi helps a patient relearn how to walk using the Lokomat.

MossRehab's Patient Outcomes in 2007 Exceed National and Regional Averages

A Message from Ruth Lefton, COO, MossRehab

MossRehab is committed to optimizing our patients' function and quality of life. As part of this commitment to quality, we grade ourselves each year by quantifying the functional gains our patients make. Using the Functional Independence Measure™ (FIM™), an instrument widely employed by the rehabilitation industry, we track our patient's admission and discharge status in 18 different functional domains, such as walking, eating and grooming.



We are pleased to report that our patients' FIM™ scores in 2007 significantly exceeded national and regional averages* for almost every type of disability we treat. Our patients achieved these gains in a reasonable length of stay and were significantly more likely to be discharged to their homes, as opposed to another healthcare facility.

Our patients were also personally satisfied with the care they received in 2007. According to Press-Ganey, a nationally recognized survey firm, over 88.8 percent of patients admitted to MossRehab would recommend us to family and friends. The 2007 patient satisfaction average for the nation's rehabilitation hospitals was 88 percent.

MossRehab's outstanding outcomes can be attributed to many factors. First and foremost is the skill and expertise of the physicians, nurses, therapists, psychologists and other staff members who provide care. Our physicians specialize in particular areas of rehabilitation—be it brain injury, stroke care, or amputee care—as opposed to the physicians at many of Moss' competitors, who are generalists. We leverage this high degree of specialization by coordinating care teams to treat patients with specific diagnoses. Our staff's use of evidence-based practice is enhanced by their collaboration with researchers in the Moss Rehabilitation Research Institute. Finally, Moss benefits from the onsite presence of Einstein at Elkins Park, an acute-care hospital that provides our patients with access to medical specialists and to the latest in diagnostic testing. You can read more about this unique relationship on page two of this newsletter.

FIM™ SCORE COMPARISONS

	MossRehab	Mid-Atlantic (PA,NJ, NY)	Nation
STROKE			
FIM™ Change	26.44	21.54	21.18
Average Length of Stay (in Days)	21.51	18.92	18.03
Length of Stay Efficiency (FIM™ Change/Day)	1.73	1.41	1.40
Percent of Patients Discharged to Home	67.21%	58.00%	62.32%
BRAIN INJURY			
FIM™ Change	34.53	25.84	25.74
Average Length of Stay (in Days)	22.86	21.72	19.72
Length of Stay Efficiency (FIM™ Change/Day)	1.86	1.62	1.66
Percent of Patients Discharged to Home	76.92%	59.05%	64.27%
SPINAL CORD INJURY			
FIM™ Change	25.06	20.25	19.86
Average Length of Stay (in Days)	25.60	25.91	21.98
Length of Stay Efficiency (FIM™ Change/Day)	1.45	1.21	1.31
Percent of Patients Discharged to Home	73.58%	63.75%	67.91%
ORTHOPAEDIC			
FIM™ Change	25.63	23.75	22.59
Average Length of Stay (in Days)	12.08	11.53	11.23
Length of Stay Efficiency (FIM™ Change/Day)	2.73	2.47	2.37
Percent of Patients Discharged to Home	86.17%	81.12%	81.20%
NEUROLOGICAL			
FIM™ Change	22.72	20.65	19.18
Average Length of Stay (in Days)	15.68	14.36	14.05
Length of Stay Efficiency (FIM™ Change/Day)	1.59	1.77	1.63
Percent of Patients Discharged to Home	85.04%	76.23%	75.53%
GENERAL/MEDICAL REHABILITATION			
FIM™ Change	23.68	20.82	19.60
Average Length of Stay (in Days)	13.46	13.18	13.38
Length of Stay Efficiency (FIM™ Change/Day)	2.16	1.83	1.69
Percent of Patients Discharged to Home	72.91%	68.51%	68.56%
AMPUTATION			
FIM™ Change	17.88	17.39	17.50
Average Length of Stay (in Days)	15.02	15.46	13.80
Length of Stay Efficiency (FIM™ Change/Day)	1.31	1.32	1.43
Percent of Patients Discharged to Home	75.86%	71.88%	75.42%

* Source: erehabdata.comSM, a service of the American Rehabilitation Providers Association.

Zolpidem Study continued

MRRI has received a three-year grant from the National Institute on Disability and Rehabilitation Research to expand its zolpidem research. Psychiatrists and caregivers across the country will soon be able to enroll their vegetative patients in a new MRRI study. Family members of the enrolled patients will receive two pills in coded form—one zolpidem, and one placebo—to be administered on separate days. Patients who react differently on the zolpidem day will be classified as probable responders. Probable responders will then go through the same process in a rehabilitation center. If the same reaction is observed, they will be classified as a definite responder.

Once a list of definite responders has been developed, the grant will cover the cost of flying these patients and a group of clinically similar non-responders to Philadelphia for further intensive study using structural and functional neuroimaging and event related potential methods.

Physiatrists who wish to enroll their patients should contact:
 Patient Registry Recruitment Office
 Moss Rehabilitation Research Institute
 215-663-6456
 participants@einstein.edu

AAPM&R Annual Assembly Preview

American Academy of Physical Medicine and Rehabilitation
2008 Annual Assembly & Technical Exhibition
November 20-23, 2008
San Diego Convention Center

The scholarly contributions of MossRehab will be well represented at this year's AAPM&R Annual Assembly in San Diego. Here's a quick preview of some of our notable presentations and posters.

Presentations

Thomas Watanabe, MD, will present on medications and TBI.

Michael Saulino, MD, will chair a breakfast symposium called "Persistent Pain: The Neuromodulation Option." Dr. Saulino will also present at the Spasticity Pre-conference on a new technique for ITB screening and issues in ITB management. He will chair two dinner roundtables: "Intrathecal Baclofen for Spinal Cord Injury" and "Intrathecal Ziconotide for Chronic Intractable Pain" as well as deliver a short presentation in the Stroke and Brain Injury Section called "Intrathecal Baclofen for Spasticity Management in Stroke: Think Small Dosing."

Nathaniel Mayer, MD, and colleagues will lead a course called "PASSOR: The Dysfunctional Upper Quadrant: The Chained, Spastic and Absent."

Dr. Mayer and **Alberto Esquenazi, MD**, will lead a course called "Sharpening Your Skills in Lower Extremity Orthotic Prescription."

John Whyte, MD, PhD, and colleagues will lead a course called "Applications of Transcranial Magnetic Stimulation to the Rehabilitation of Cognitive and Motor Sequelae of Stroke."

Dr. Saulino and **Arthur Gershkoff, MD**, and colleagues will lead a course called "Stroke/TBI Research and Clinical Pearls."

Dr. Esquenazi, Dr. Saulino and Dr. Watanabe will be faculty members for a pre-conference course called "Advanced Assessment and Management Skills for Spasticity, Dystonia, and Related Motor Disorders: An Interactive Hands-On Workshop."

6 www.insidemossrehab.org



Posters

Intrathecal Ziconotide-Baclofen Combination Therapy for Spasticity and Neuropathic Pain Resulting from Spinal Cord Injury: A Case Series by Michael Saulino, MD

Intrathecal Ziconotide for Phantom Limb Pain: A Case Report by Michael Saulino, MD

The Effect of Rehabilitation Program on the Gait of Patients with New Transtibial (TTA) and Transfemoral Amputations (TFA) by Maria Lucas, PT, Chris Gorrell, DPT, Nancy Beecher, MPT, and Alberto Esquenazi, MD

Emergency Preparedness for Persons with Disability by Steven Parrillo, DO, Julie Hensler-Cullen, RN, MSN, and Albert Esquenazi, MD

Safety and Efficacy of Enhanced External Counterpulsation in Anticoagulated Patients with Refractory Angina by Debra Braverman, MD

Patient Registry of Outcomes in Spasticity Care (PROS) by Alberto Esquenazi, MD

Sharpening Your Skills in Lower Extremity Orthotic Prescription by Alberto Esquenazi, MD

MOS-2428-08
© 2008 AEHN

MossRehab
Einstein

60 Township Line Road
Elkins Park, PA 19027