

Mild Brain Injury Can Have Long-Term Effects

BY DIANA MAHONEY

The consequences of mild traumatic brain injury are often anything but mild. Recent studies linking concussion to long-term neurologic deficits suggest that, for some individuals, the characteristic transient brain dysfunction and acute symptom resolution represent the beginning of potentially irreversible structural and functional brain alterations.

"Traumatic brain injury occurs as a spectrum disorder. The term 'mild' describes only the initial insult relative to the degree of neurological severity. There may be no correlation with the degree of short- or long-term impairment or functional disability," said Dr. Nathan Zasler of the University of Virginia, Charlottesville, and medical director of the Concussion Care Centre of Virginia in Glen Allen.

By definition, mild traumatic brain injury (mTBI) results from direct trauma to the head or from an acceleration/deceleration stress to the brain. Such an injury poses a risk for short-term symptoms including headache and difficulty with balance, thinking, concentrating, and sleeping, and may lead to long-term symptoms categorized as postconcussive syndrome, according to the National Institute of Neurological Disorders and Stroke.

Investigators at the University of Illinois at Urbana-Champaign showed that college athletes with a history of sports-related concussion continue to have diminished brain function for a number of years after their injuries (J. Neurotrauma 2009 March [doi:10.1089/neu.2008-0766]). Specifically, "we were able to show that while our group of club and intercollegiate athletes performed normally on standard clinical neurocognitive assessment, they had suppressed brain functioning at an average 3½ years post injury, including a decrease in attention allocation to things going on in their environment," lead investigator Steven Broglio, Ph.D., said in an interview. The findings provide further evidence that concussion should not be considered a transient injury associated with short-lived neurologic impairment, he noted.

The authors of a widely reported Canadian case control study reached a similar conclusion. The study compared the neurocognitive status of currently healthy former university-level hockey and football players aged 50-65 years who had sustained a single concussion more than 30 years ago with that of former athletes with no concussion history. Electrophysiologic and neuropsychological tests indicated that individuals with a history of concussion had memory and attention problems along with slower reaction times relative to those of the controls (Brain 2009 Jan. 28 [doi: 10.1093/brain/awn347]).

At the more extreme end of the damage spectrum, biopsies of the brains of six former NFL players between the ages of 25 and 50 who had experienced multiple concussions during their careers revealed evidence of chronic traumatic encephalopathy, according to investigators at Boston University's Center for the Study of Traumatic Encephalopathy (CSTE). All six players had had emotional and behavioral problems such as drug abuse, and two committed suicide, said Dr. Ann C. McKee, lead investigator and CSTE codirector.

Mounting evidence of long-term effects of mTBI in athletes has led to growing concerns about the fre-

"This is why [mTBI] is sometimes called an invisible injury—people can look fine on the outside, but they may not be behaving fine, thinking fine, sleeping fine."

Still, he added, most patients with single mTBIs recover relatively soon if they don't have comorbidities, or psychiatric or neurological histories that increase their vulnerability.

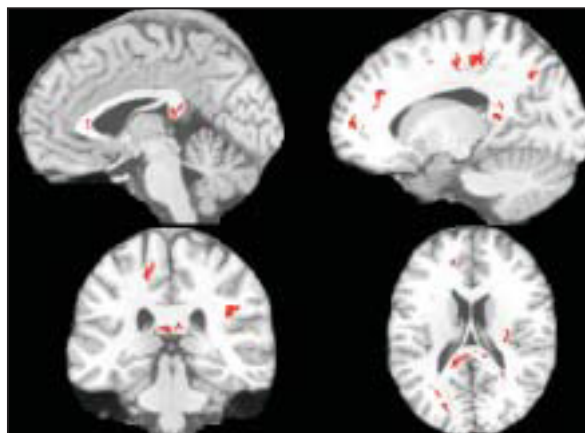
New evidence confirms suspicions that post mTBI problems are substantially underreported. Karen Hux, Ph.D., of the University of Nebraska-Lincoln and her colleagues evaluated a TBI screening procedure at vocational rehabilitation centers, domestic abuse and homeless shelters, and mental health centers. Of 1,999 screening protocols administered by professionals from four service agencies over a 6-month period, 531 were positive for a possible mTBI of sufficient severity to affect quality of life (Brain Inj. 2009;23:8-14).

The only objective method for detecting or confirming mTBI is specialized medical imaging. "CT and MRI scans of patients suffering persistent cognitive impairment as a result of mild traumatic brain injury usually look totally normal. When you look at the raw images, you can't really see anything abnormal. What you need to do is look at the images quantitatively," said Dr. Michael Lipton of the department of radiology at Albert Einstein College of Medicine in New York. He and his colleagues use MRI-based diffusion tensor imaging (DTI) to map the location, orientation, and anisotropy of the brain's white matter tracts. "We analyze each and every voxel of the brain looking for statistically significant differences between [mTBI] patients and healthy controls."

The ability to detect subtle neuronal injury has important clinical implications for the management of mTBI, Dr. Lipton said. Identifying individuals with mild injury would allow the use and evaluation of candidate therapies designed to arrest the progression of damage.

Although the clinical utility of DTI has been established and the technology is being used at many academic centers for clinical measurement, "with the current state of the art, it requires specialized expertise to be able to extract information from the images," he said.

The early identification and management of mTBI should get a boost from evidence-based clinical guidelines by the American College of Emergency Physicians and the CDC. Although the 2008 guidelines are written primarily for emergency physicians, "many patients with mild traumatic brain injury seek care from other practitioners such as internists," said Dr. Andy Jagoda of Mount Sinai School of Medicine in New York, and chair of the guideline writing panel. For that reason, all clinicians should be made aware of them. ■



Diffusion tensor imaging reveals subtle neuronal damage (red) in mild traumatic brain injury.

IMAGES COURTESY DR. MICHAEL LIPTON

quency of concussions among U.S. soldiers in Iraq and Afghanistan. An anonymous survey of more than 2,500 active duty and reserve soldiers conducted 3-4 months after a year-long tour of duty in Iraq showed that mTBI, when associated with a loss of consciousness, led to an increase in posttraumatic stress syndrome, relative to soldiers who had sustained other types of injuries or no injuries (N. Engl. J. Med. 2008;358:453-63).

Considering the large number of U.S. combat soldiers at risk for mTBI, the Department of Defense has mandated that all deploying troops undergo a cognitive functional assessment to serve as a baseline measure for comparison in case of later mTBI.

According to the Centers for Disease Control and Prevention, an estimated 5%-15% of individuals in the general population who sustain an mTBI have long-term deficits of some sort, although actual numbers are difficult to ascertain. "Not all people who sustain a mild brain injury recognize some of the later cognitive and behavioral impairments as related to the injury, and many don't seek medical treatment," Dr. Zasler said.

Obstructive Sleep Apnea Increases Risk of Death After Stroke

BY DOUG BRUNK

SAN DIEGO — The presence of obstructive sleep apnea independently increases the risk of death after acute ischemic stroke, results from a single-center study showed.

The finding underscores the importance of screening for obstructive sleep apnea (OSA) as a risk factor for the development of stroke, since effective treatment for the condition is available, researchers led by Dr. Meghna P. Mansukhani reported during a poster session at the International Stroke Conference.

The finding also confirms results of a 10-year Swedish study that demonstrated an increase in mortality in stroke patients diagnosed with OSA after the

stroke by polysomnography (Arch. Intern. Med. 2008;168:297-301).

For the study, Dr. Mansukhani and her colleagues in the departments of family medicine, emergency medicine,



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DR. MANSUKHANI

and cardiovascular diseases at the Mayo Clinic, Rochester, Minn., studied 174 consecutive patients who presented with acute ischemic stroke during June

2007-March 2008. The patients were asked to complete the Berlin Sleep Questionnaire, a simple instrument that has been shown to have good sensitivity and specificity as a screening test for OSA in the primary care setting.

The mean age of the patients was 72 years, and 55% were female.

The three most common stroke subtypes were cardioembolic (33%), large vessel disease (27%), and undetermined etiology (27%).

A total of 105 patients (61%) had a high risk of sleep apnea on the basis of their responses to the Berlin Sleep Questionnaire. Of these, seven had a previous diagnosis of OSA, and there was no difference by gender or age in the prevalence of high or low risk for OSA.

Of the 174 patients studied, 11 died

(6%). Those who had a previous diagnosis of OSA were 5 times more likely to die within the first month following the stroke, compared with those who did not have a diagnosis of OSA.

"We were trying to establish whether there was an increase in mortality in patients at risk of or with previous diagnosis of OSA in our cohort, and indeed, the study did confirm this," Dr. Mansukhani said in an interview after the conference, which was sponsored by the American Heart Association.

Limitations of the study, she added, included the fact that "there could be potential confounders such as diabetes mellitus that were not accounted for and that may have biased the results."

Dr. Mansukhani said she had no conflicts to disclose. ■