



TBI Challenge! (Vol. 4, No. 4, 2000)
**Persistent Post-concussive
Syndrome**
by Robert Perna, PhD



INTRODUCTION

Mild brain injury is very common and accounts for 66-75% of all hospital admissions for head trauma. Most persons with mild TBI generally report a similar pattern of symptoms which include physical, cognitive and emotional/behavioral challenges. Common symptoms following the injury include poor concentration, memory problems, irritability, headaches, fatigue, depression, anxiety, dizziness and increased sensitivity to sound and light (Alves, 1992; Miller, 1993; Slagle 1990). This cluster of symptoms usually is referred to as a post-concussive syndrome (APA, 1994), which has been estimated to affect 50-80% of individuals within three months after a mild TBI (Mittenberg & Burton, 1994; Long & Novack, 1986).

Post-concussive syndrome (PCS) can last from months to years following injury the initial injury (Gouvier et al., 1992), and both organic/physical and psychological causes have been suggested (Bohnen & Jolles, 1992). These symptoms obviously are very distressing and often result in difficulties in activities of daily living (ADLs) and/or an inability to return to prior employment. Although fewer and fewer people are affected by these difficulties as time progresses post-injury, some people will continue to experience symptoms long after their injury, even if brain scans (i.e., MRIs, CT, EEG) are completely normal. Most studies suggest that approximately 15% of these individuals will continue to report symptoms one year post-injury (Satz et al., 1999).

Research is beginning to demonstrate that this small group of individuals who continue to exhibit post-concussive syndrome is very heterogeneous in makeup (i.e., some have normal brain scans others do not, some have poor outcomes, some may have good outcomes).

PERSISTENT POST-CONCUSSIVE SYMPTOMS

Many researchers have speculated on why this small group (15%) of individuals continues to evidence persistent post-concussive syndrome (PPCS) long after their injury. A number of neurocognitive, psychosocial, premorbid and injury-related variables have been implicated in the maintenance of PCS, although the findings among the various research studies have been conflicting. In 1996, Alexander indicated the evidence suggests that chronic pain and depression are the most common mechanisms of PPCS. Neuropsychological research has shown that

significant emotional distress can impair one's cognitive abilities and cause people to become more focused on their physical symptoms; however, a person's complaints should never be discounted or assumed psychological, without an appropriate evaluation to rule out possible physical causes.

Several other researchers have speculated that pre-injury personality factors (Szymanski & Linn, 1992), pre-injury substance abuse (Rimel et al., 1981) and even monetary compensation (McKinley, Brooks & Bond, 1983) all are important factors in post-concussive syndrome. There has been and continues to be considerable research attempting to clarify this complex issue. In their studies, Satz et al. (1999) have been critical of the methodology used in most studies on PCS, indicating that researchers often are not utilizing the appropriate control or comparison groups.

The implication of these methodological shortcomings is that people sustaining post-concussive syndrome may be misdiagnosed and ultimately receive inappropriate or no treatment at all. The perplexities of PCS have led to two different viewpoints on the issue among physicians and neuropsychologists. Some believe that most individuals with PCS have normal MRIs, so their cognitive difficulties must be secondary to pain, emotional distress and/or lack of motivation. There is considerable research which demonstrates that pain and depression can impair performance on neuropsychological evaluations.

BRAIN SCAN FINDINGS

Other health care professionals basically believe that PCS likely is related to persistent mild cerebral dysfunction. Consistent with this belief system is the idea that many types of brain dysfunction do not show up on MRI, CT or EEG scans. Lewine and colleagues (1999) indicate that many persons with significant neuropsychological dysfunction, secondary to mild traumatic brain injury, have normal MRI and EEG scans. Recent neurological research evaluating individuals with PCS using a combination of MRI-imaging and magnetoencephalography (MEG)—a method that is more sensitive than EEG and MRI in providing objective evidence of minor brain injury—is starting to illuminate this controversial issue. Lewine and colleagues (1999) found that MEG indicated brain dysfunction in significantly more persons with PCS than either EEG or MRI. MEG provided objective evidence of brain injury in individuals with PCS and correlated well with degree of symptomatic recovery. The use of functional imaging including SPECT and PET (i.e., scans measuring brain circulation and metabolism) also appear very useful as neuro-diagnostic measures in this population even in the presence of normal MRI (Stringer, Balsereio & Fidler, 1991). Researchers have compared SPECT, MRI and CT scans in individuals experiencing PPCS, finding abnormal SPECT

scans in 53% of the population, abnormal MRIs in 9% and abnormal CTs in only 4.6% of the population.

In addition to possible structural changes to the brain, which may explain PCS symptoms, there may be many other valid physiological causes related to the initial injury. For example, the dizziness may be caused by damage to the vestibular system in the ears, the hearing disturbances may result from damage to the bones and membranes in the ears, the visual disturbances may occur as a result of retinal and cranial nerve damage, and post-traumatic headaches are caused by abnormal cerebral circulation and neurochemical changes. There also exists another line of research that may help clarify the causes of post-concussive syndrome. Stein's (1999) research findings suggest that at the cellular level there are many changes even years after the injury. Stein also reports that even localized brain injury can cause distal changes far from the injury in other, connected parts of the brain.

It is likely that we will come to a better understanding of PCS in the near future, thereby improving services and care for individuals with mild TBI. As evidence continues to build in support for the validity of those affected by PCS, it is hoped that healthcare providers and insurance companies likely will be more able and compassionate in their dealing with these individuals.

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