# USE OF DEMONSTRATIVE EVIDENCE IN THE TRIAL OF A MILD TRAUMATIC BRAIN INJURY CASE

Your client, who sustained a closed head injury in an automobile crash one year ago, appears perfectly fine as his trial approaches. He has no disfigurement, no scars, no limp, and no visible sign of impairment. To look at your client, one would never suspect how his head injury has so disrupted his life, causing him problems physically, cognitively and emotionally. No wonder victims of mild brain injury are known as "the walking wounded." You are keenly aware of the many facets of your client's brain injury, but how can you possibly prove to the jury the true nature and extent of his injury? This is a dilemma for plaintiff's counsel in almost every mild traumatic brain injury case.

Sure, you can elicit testimony from relatives, friends, co-workers, and physicians to describe your client as brain injured. However, you will undoubtedly need more evidence to fully demonstrate the injury and to motivate the jury to render an award large enough to fairly compensate your client. There is perhaps no other type of injury case which necessitates the use of demonstrative evidence more than the trial of a mild brain injury case. This article focuses on some of the categories and items of demonstrative evidence which may be helpful in a mild brain injury case.

## BIOMECHANICAL ASPECTS OF THE TRAUMA

Since your client's brain injury was caused by a traumatic

event, it is often advantageous to use visual aids to explain how the forces of the accident were exerted on your client's head and brain. If your client was injured in an automobile crash, photographs of the vehicles may be your best evidence. Such photographs may include not only the body damage to the vehicles, but also a bent steering wheel, a broken headrest or seat, or a shattered windshield. Particularly effective may be photographs taken of the interior and exterior of a windshield which has a spider web pattern as a result of contact with your client's head. It should also be kept in mind that accident reconstruction drawings and diagrams are not just tools to prove liability, they also may assist the jury in understanding and appreciating the forces of a crash.

A simple but powerful way to demonstrate the injury, in appropriate cases, is to have your client's treating physician use a model of the skull and brain to explain how the brain and skull react when accelerated and decelerated. While using the model, the physician can explain that the skull is a rigid structure, but the brain has the consistency of jelled gelatin, and that rapid changes in direction of movement of the skull and brain can cause stretching and shearing of tissue and fibers in the brain. There are some interesting short animated films which depict this process.[1]

In many cases, the mild brain injury victim also has suffered extreme injuries to the face or head. Obviously, photographs of such lacerations, bruises, or other injury should

be shown to the jury.

## NEURODIAGNOSTIC TESTS OF MILD BRAIN INJURY

There exist numerous neurodiagnostic tests which the clinician can use to assist in determining the nature and extent of a patient's brain injury. When such test results are displayed and explained properly to the jury, they may provide objective and persuasive proof of your client's brain injury. Among the most common tests, all available in Virginia, are: (1) CT Scans; (2) MRI's; (3) SPECT Scans; (4) EEG's; and (5) BEAM Tests.

CT Scans and MRI's are neuroimaging techniques, which provide an image of the structure of the brain.[2] CT Scan refers to computerized tomography, in which a scan is produced by a computer generated reconstruction of the brain determined by the absorption of x-rays by the brain. MRI refers to magnetic resonance imaging, a technique which produces an image by the use of magnetic fields on the nuclei of atoms and does not involve the use of x-rays. MRI provides a more detailed anatomical picture of the brain than a CT Scan. Where your client's CT or MRI displays an abnormality, then having the physician show and explain the scan to the jury is usually effective. It is also possible to construct 3-D computerized models of brain damage from CT's and MRI's. Such 3-D models can show shape, form, and color which provide a much more discernable image for the jury than the standard films.

SPECT Scans, EEG's, and BEAM's are tests of brain function or activity, not anatomical images. SPECT refers to single photon emission computerized tomography. It involves injecting the patient with a radioactive isotope and then producing a scan which shows the distribution of radioactivity in the brain. The scan allows for a determination of the metabolism of the brain. In many cases, the SPECT will demonstrate areas of altered brain blood flow, even though the CT or MRI reveal no structural abnormality. 3-D computerized models of SPECT Scans also may be made for display to the jury. The author and Charles Purcell of Louisa, Va. recently had a 3-D SPECT Scan video produced for a mild brain injury case where the SPECT revealed a temporal lobe defect. A still photograph made from this 3-D video is shown in Exhibit 3.

EEG refers to electroencephalography. It involves recording the electrical activity of the brain and is based on the fact that each nerve cell converts chemical energy to electrical energy in order to transmit messages along its length. Standard EEG is most often used to diagnosis epilepsy, but is also used with patients who have suffered altered states of consciousness. BEAM, brain electrical activity mapping, involves a computerized analysis of the electrical activity of the brain and plots it on a graph or map. BEAM is used to demonstrate subtle changes in the brain that cannot be determined from inspecting brain wave activity of standard EEG's.

Neurodiagnostic tests, such as the one described in this article, are obviously sophisticated, complicated procedures. In determining whether or not to use the test results at trial, counsel must carefully consider: (1) the type of equipment used in the test procedures; (2) the credentials, expertise and experience of the technician conducting the test procedures; and (3) the credentials, expertise, and experience of the clinician interpreting the test results.

## NEUROPSYCHOLOGICAL TESTING

Neuropsychology deals with the relationships between the brain and behavior. Neuropsychological assessment of brain injured victims involves the use of numerous tests to measure deficits, both cognitive and emotional, and correlate such deficits to the traumatic brain injury. Such assessment relies on the comparison of the victim's test performances to the victim's expected premorbid pattern of test performances. In mild brain injury cases, neuropsychological assessment may demonstrate significant deviations in the victim's abilities following the trauma. Where a clear pattern is demonstrated in such testing, it may be helpful to use graphs, charts, or compilation summaries for the neuropsychologist to refer to in explaining the deficits to the jury. Counsel, however, should be careful to use such evidence only where the test results are significant, correlate with the clinical examinations of the

patient, and are otherwise not subject to attack on cross-examination. This requires counsel to make sure the neuropsychologist will not be blindsided with information about the patient that the neuropsychologist does not already possess. It also requires counsel to meet and review all pertinent raw test data with the neuropsychologist.

## MISCELLANEOUS EXHIBITS

Since the brain is such an intricate and fragile organ, diagrams, charts and illustrations of the brain and its network of neurons are especially helpful in providing a graphic depiction for the jury. Customized medical illustrations of your client's injures may be particularly effective. There are even computer software programs which allow for easy, customized illustrations to be made.[3]

Videotaping your client in several settings may also provide the jury with visual proof of his brain damage. This may include videotaping your client at home, at his job, or undergoing medical tests, procedures, or therapy. The author recently had a client's initial interview with his physician videotaped in order to preserve the speech impediment suffered by the client as a result of his mild TBI. Since this videotaping, the client's speech problems have improved.

Often charts and diagrams may be well suited for mild TBI cases. For example, a chart depicting the day to day functional activities of your client, before and after the trauma, may be

introduced through a family member. Likewise, blow-ups of job evaluations, comparing work performance before and after the trauma, may be introduced through an employer.

## SUMMARY

In preparing your mild traumatic brain injury case for trial, counsel should pay close attention to the use of demonstrative evidence. This is a continuous process that requires counsel to look for, and develop, such evidence from the very first time your client comes to see you. It is a process that is fun and challenging and can reward counsel who is creative, imaginative, and thorough.

## EXHIBITS

Exhibit 1. MRI of the brain of mild TBI victim, demonstrating abnormality at the gray-white junction, consistent with axonal shear injury (often associated with acceleration/deceleration of skull and brain).

Exhibit 2. SPECT Scan of brain of mild TBI victim, demonstrating significant hypoperfusion in the nondominant temporal lobe. This patient's CT and MRI were unremarkable.

Exhibit 3. Still photograph made from 3-D video of SPECT Scan of mild TBI victim. Note how the 3-D computerized image provides a textured shape and form of the brain, much more discernable for the jury.

Exhibit 4. The upper figure is the "P-300", a cognitive evoked potential, which is a marker of disordered attentional processing. The lower figure is a quantitative EEG. These studies may demonstrate subtle abnormalities not shown on standard EEG's.

## FOOTNOTES

1. Technical Medical Animation Corp., "The Closed Head Injury," animated video, TMAC, 1830 Platte Street, Denver, Colorado 80202.
2. MRI may also be used to test for brain functioning, with the use of chemical markers.
3. A.D.A.M. Software Inc., 1899 Towers Ferry Road, Suite 460, Marietta, GA 30067.
4. The author would like to thank Nathan D. Zasler, M.D., Executive Medical Director of National NeuroRehabilitation Consortium and Concussion Care Center of Virginia, Richmond, Virginia, for his technical assistance in the preparation of this article.