

**ENVIRONMENTAL NEUROTOXICITY:
EFFECTIVE DEFENSE OF NEUROLOGICAL INJURY**

Peter G. Bernad, M.D., M.P.H., F.A.C.P.

Neurology Services, Inc.

10721 Main Street

Suite 2500

Fairfax, VA 22030

ENVIRONMENTAL NEUROTOXICITY:
EFFECTIVE DEFENSE OF NEUROLOGICAL INJURY

Peter Bernad, M.D., M.P.H., F.A.C.P.
Neurology Services, Inc.

I. INTRODUCTION

There is ever-growing awareness of potential neurological injuries resulting from chemical exposures and head injuries. Toxic chemicals, from pesticide and solvent exposures to drug overdoses, can have an array of neurologic effects. These illnesses are environmentally induced neurotoxicities; they are neither genetic or degenerative diseases but rather are caused by an outside, or "environmental" factor.

Environmental neurotoxicity can effect both the central and peripheral nervous system. Symptoms range from memory loss and irritability, to shaky hands and loss of balance. Sorting out medically, the most probable cause of these generic symptoms, requires extensive historical knowledge of the symptom complex of the litigant, along with careful neuro-diagnostic testing and expert analysis.

It is human nature to sympathize with an individual experiencing medical difficulties and to attribute these difficulties to the most recent or memorable external event that had the potential of producing their symptoms. This assumption can be a disservice to the injured patient. Treatment of symptoms can be more appropriately prescribed when true cause is known. An example of this would be the following scenario: A chemical exposure causes concern to the individual, leads to stress and tension, and ultimately results in decreased attention span displayed as apparent memory loss and a sense of dizziness. In this scenario, the outlook for patient recovery is high with proper psychologic treatment. In another case, the same symptoms may be assumed to be the result of a head injury, however, the patient may have been exposed through work to various chemicals producing these

same symptoms and have symptomatic levels of the chemicals measured in their body. In this later case a recommended change in work conditions would be the greatest service to the patient. From these scenarios, it is clear that the key to defense against environmental neurotoxic injury is the ability to evaluate the symptoms and sort out the probabilities associated with all potential causal agents.

II. DEFENSE AGAINST CLAIMS OF NEUROLOGIC INJURY

Effective defense for alleged neurologic injury is possible through expert neurologist review of all scientific data and a comprehensive examination of the patient. Frequently, although neurologic damage may have occurred, the cause is unrelated to the specific event in question. A team approach through a clinico-pathologic conference is ideal for the review of relevant material and also provides a useful means of patient evaluation. Conferences with all experts present can often reveal holes in the plaintiff's arguments and lay a firm scientific foundation for defense.

To prepare for these conferences, the expert neurologist must determine the plaintiff's condition prior to the alleged onset of symptoms, the true extent of the symptoms, and possible causes of these symptoms. Necessary steps for this determination are summarized below.

A. Patient History

The first step in defense against claims of neurological injury is to obtain an extensive history of the patient. Historical evaluation is used to determine all causal factors that may contribute to the alleged symptoms. Additionally, this history provides information to determine the patient's status prior to the theoretical cause of the symptoms.

1.) Determination of Symptom Cause - Any given neurological symptom can have many different causes. These potential causes include previous accidents involving head or back injuries, illness and neurological disease, and exposure to various chemicals both on the job and elsewhere. To diagnose the most probable cause of the alleged symptoms, all events that may result in neurological damage must be considered. Therefore, the claimant's history must include previous medical problems, accidents, places of employment, and domicile environment.

2.) Determination of Status Prior to Alleged Injury - To confirm the validity of a claim, the litigants status before the alleged causal event must be determined. A variety of historical records can assist in determining the claimant's prior status. For example, in a recent case of alleged benzene chemical exposure, resulting in attention deficit disorder in a child, it was necessary to review statements of the parents and records from school teachers and other observers. From these records it was established that the child actually had a long standing attention deficit and learning disability. This case demonstrates the importance of a comprehensive evaluation of previous records such as birth records, school and military records, and work evaluations along with prior medical examinations to determine prior status of the claimant.

Thus, the task of the defense neurologist is not only to carefully examine the events surrounding the alleged cause of injury, but also to carefully evaluate all other historical components.

B. Examination and Testing

picture of the brain soft tissue. This technique and CAT scans have different strengths and weaknesses in analyzing soft tissue.

- o Electroencephalograph - (EEG) Electrical brain waves recorded to indicate physiologic state of the brain.
- o EMG-Nerve Conduction - Evaluation of nerve function, and muscle function and condition.
- o Somatosensory Evoked Response - computerized response of nervous system to stimuli along peripheral and central nerve pathways.
- o Brain Mapping - Quantitative encephalography (EEG).
- o Thermography - Evaluation of the sympathetic nervous system for diagnosing causalgia, reflex sympathetic dystrophy.
- o Quantitative Sensory Evaluation - Evaluation of nerves using semi-quantitative techniques.
- o Positron Emission Tomography - (PET scan) Functional assessment of the brain, as it utilizes sugar and other chemicals.

Appropriate diagnostic tests are essential in defense against neurological damages. The "back pain" that can not be detected with negative routine x-rays, computerized tomographic scanning, magnetic resonance imaging, EMG-nerve conduction, somatosensory evoked responses, and thermography has little weight in a court of law when presented to a jury.

C. Final Evaluation

The neurologist must be both objective and qualified to evaluate all tests conducted on the patient to determine the proper diagnosis. Concerned, treating doctors will frequently "go

Careful consideration and inquiry must be taken in determining the presence and true extent of symptoms. A complete physical examination with appropriate diagnostic testing can assist in determining this. The exam should include a general physical exam, medical, and specific neurological exam to determine the type and extent of symptoms.

1.) Determination of the Type of Symptoms - Understanding the true complaint of the patient can be more difficult than first appears. Terminology used in describing symptoms can present difficulties in communication. This is clearly demonstrated by the symptom of "dizziness", which may occur after a head injury. The term "dizzy" may be used to mean lightheadedness, unsteadiness, or loss of balance. Occasionally there is true vertigo, however most of the time this is not the case. The neurologist must determine what is truly meant by the terms of symptomatology used by the litigant patient.

Objective testing for findings must then be conducted in addition to testing for a wide differential diagnosis. These tests provide a means to confirm or disprove the litigant patient's claims.

2.) Determination of the Severity of Symptoms - Objective neurologic, neurophysiologic, and neuropsychologic testing is used to determine the true extent of symptoms. There are many diagnostic test that can be employed to assist in this determination. Some of these tests are listed below:

- o X-rays - Pictures of bones in skull, cervical spine, back, and other bony structures.
- o Tomographic Scanning - (CT or CAT scan) Series of x-ray pictures of skull, brain and other soft tissue that can be assembled into a three dimensional picture by a computer.
- o Magnetic Resonance Imaging - (MRI) Develops a

along" with the patient's complaint. Unwittingly, an identification with the alleged injured patient can occur that influences a treating doctor's ability to make objective diagnosis.

Limited evaluation and misinterpretation of diagnostic tests is another important factor in defense against neurological injury. In a recent publication, the potential misuse of a computer-based neurobehavioral evaluation system was emphasized. Computer systems that increase ease of test administration could lead to wider use by plaintive experts who may not be entirely qualified to interpret these test results. Proper evaluation of tests requires understanding of the theoretical basis behind the test and awareness of the test's significance and limitations. Neurobehavioral test performance in particular may be influenced by a wide variety of factors. These factors include cultural and demographic background of the patient, fatigue, as well as general health and motivation. It is the responsibility of the defense neurologist to be aware of these factors.

Proper evaluation of tests is an essential and oftentimes controversial process. There are no tests that are both 100% specific as well as 100% sensitive. The medical expert must acquaint the defense attorney with the widest possible differential diagnosis of all conducted tests with "positive" results. These test results must then be considered in relation to the claimant's history to determine the most probable cause of the symptoms.

III. SUMMARY

Successful defense against litigation involving head injury, neurotoxic tort, neck and back injury, or peripheral nerve injury requires the forensic neurology expert to be thoroughly familiar with the pertinent medical issues. This expert must be able to provide as wide a differential diagnosis as possible. Comprehen-

scientific ally in the courtroom. neurologic forensic witness will be a most formidable and helpful prior to deposition. With thorough preparation, the expert opinions is mandatory and should required by the defense attorney expert testimony. Good scientific support for an expert's good defense. There is no room for capriciousness in medical causation, within reasonable medical certainty, is essential to a An honest assessment of the key neurological issues and their lead further credibility to the expert witness.

Board certification and an ongoing clinical practice experience physical examination, and diagnostic testing of the patient. involves exhaustive analysis medical and general history, give preparation prior to depositions and court testimonies