

**SCIENTIFIC EVIDENCE FOLLOWING
DAUBERT VS. MERRILL DOW:
ARE PET SCANS ADMISSIBLE TO ESTABLISH
TRAUMATIC BRAIN INJURY?**

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“Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone, the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.” Frye v. United States, 54 App. D.C. 46 at 47, 293 F. 1013 at 1014 (1923).

Introduction

As technology and scientific knowledge have evolved at an ever increasing pace, courts throughout the country have struggled with the formidable task of separating scientific fact from fiction. One need only recall the world-wide media hype that followed the announcement by researchers that they had discovered a method for cold fusion (a claim which later proved false) to understand how difficult it can be to separate scientific fact from scientific fiction. For years our courts have struggled to develop an evidentiary standard that could be applied across the wide range of scientific knowledge and testimony. Personal injury litigation has become one of the battlegrounds where scientific theory and practice are put to the test.

Neurolawyers have long dreamed of an “objective” test that could conclusively establish the existence of brain injury in cases of mild to moderate TBI where CT scans, MRI’s and EEG’s are negative or inconclusive the vast majority of the time. Too many brain injured individuals have been denied the compensation they deserve by insurance adjusters or juries who where

unwilling to accept the diagnosis of brain injury based on “subjective” reports of impairment or neuropsychological testing. In recent years a new technology has evolved which holds promise of establishing an objective test for the presence of brain injury. That technology is Positron Emission Tomography, otherwise known as PET scanning.

What is PET Scanning?

Non-invasive imaging techniques such as CT and MRI enable clinicians to study internal anatomical structures at a level of detail only imagined 50 years ago. These techniques produce images of the change in structure or anatomy that can occur following disease or injury. Biochemical processes may also be altered by disease or injury and such alteration may occur before there is a change in gross anatomy. While CT and MRI may reveal considerable information about the internal **structure** of various body parts they reveal very little information about the **function** of those parts. This is particularly true for the brain. Many studies which have been widely accepted in the medical community clearly document that a brain which is functioning abnormally may appear structurally “normal” on CT or MRI. What makes PET scanning dramatically different from CT and MRI is PET’s ability to image brain function as well as structure. PET is unique because it produces images of the body's basic biochemistry or function. PET can reveal changes in the brain’s organic processes and biochemical function in diseases, such as Alzheimer's disease, where there is no gross structural abnormality.

Having a PET Scan performed is a relatively simple procedure from the patient’s perspective. It involves the use of a small amount of a radioactive material, similar to materials used in other nuclear medicine procedures. Radioactive isotopes are attached or tagged to a compound, such as glucose, that is used by the body. The radioisotope is administered to the patient, usually by injection, and a PET scanner images how the body processes the compound. Brain function can be determined by measuring how various areas of the brain metabolize the radioactive glucose. Diminished uptake means that area of the brain is not functioning properly.

The first PET scanner was introduced in 1975. *Early PET scanners had a small number of radiation sensors to build the image which limited the images to one slice at a time. The slices were also very thick. Thus, the first PET images were of low quality and definition. These limitations made it impossible to obtain the finer details of localization of function in the brain, so their clinical usefulness was quite limited, as compared with modern models. Improvement in PET imaging has been achieved by using a larger number of better quality radiation sensors, more sophisticated computer software to*

interpret the data, and the ability to obtain several slices simultaneously by using multiple rings of sensors. PET has been in regular clinical use since the early 1990's.

Scientific Evidence in the Courts

From roughly the beginning of the fourteenth century, courts have limited the admission of hearsay evidence, particularly opinion testimony.¹ Although its admission was generally restricted, opinion testimony was traditionally allowed where the evidence was outside the realm of common knowledge and the evidence was based on the testimony of a witness qualified as an expert by virtue of training, knowledge, skill or experience in the pertinent subject area.² The “Frye Rule,” which held that scientific evidence could be admitted only if it had gained “general acceptance” within the particular field, marked the first substantial limitation on the admission of expert testimony. It continued to be the most widely adopted and followed rule governing the admissibility of expert testimony for the next seventy years.

The first significant change in the manner in which the federal courts viewed expert testimony occurred in 1993 when the United States Supreme Court released its opinion in Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, (1993). The Daubert Court held that Rule 702 of the Federal Rules of Evidence superseded Frye as the appropriate standard for determining admissibility of expert testimony as to scientific evidence in Federal courts. Rule 702 provides:

If scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.³

Thus, Rule 702 contains a two-part test for the admission of an expert’s opinion: 1) Does the expert’s opinion relate to a matter of scientific, technical or specialized knowledge?; and 2) Will the expert’s testimony be helpful to the trier of fact in determining a fact at issue in the case?

¹ Lee, Patrick. Translating Evidence into Practice 1997 Conference Summary - Session B: Scientific Evidence and the Courts - The Daubert Case and Expert Opinion. [Http://www.ahcpr.gov/clinic/trip1997/trip2.htm](http://www.ahcpr.gov/clinic/trip1997/trip2.htm).

² Id.

³ Federal Rules of Evidence (as amended through December 1, 1994).

“Scientific knowledge” must be more than a mere belief; it must be fact or theory grounded in methods or procedures of science.⁴ The Daubert opinion lists several factors germane to the question of whether or not proffered evidence constitutes admissible “scientific knowledge.” Factors identified by the Court include: whether the evidence is based on a testable theory or technique; whether the theory or technique has been subjected to peer review and publication; the known or potential error rate of the theory or technique; and, general acceptance of the theory or technique within the scientific community. These four factors were not intended to be all inclusive. Rather, they were intended as a guide in the application of the “flexible” “inquiry envisioned by Rule 702.”

The role of a federal trial judge post-Daubert has been described as that of a “gatekeeper” whenever scientific evidence is concerned. Trial judges now must not only decide whether the expert is “qualified”, but they must also decide whether the expert’s methodology is “reliable.” In a Daubert hearing, the trial judge applies Rule 104(a) of the Federal Rules of Evidence to qualify the expert witness and make a preliminary finding as to whether the reasoning or methodology underpinning the expert’s proffered testimony is scientifically grounded and can properly be applied to the facts at issue.⁵ Writing for the Court in Daubert, Justice Blackmon expounded on Rule 702’s departure from the stringent Frye test:

Nothing in the text of this Rule establishes “general acceptance” as an absolute prerequisite to admissibility.... The drafting history makes no mention of Frye, and a rigid “general acceptance” requirement would be at odds with the “liberal thrust” of the Federal Rules and their “general approach of relaxing the traditional barriers to ‘opinion’ testimony.”⁶

Following the release of Daubert, several states abandoned the Frye rule in favor of Daubert’s newer, supposedly more liberal approach to expert testimony. Currently 28 states apply the Daubert rule, although several of them couch their decisions in terms of state rules similar to the Federal Rule interpreted by the Court in Daubert.

States adopting Daubert outright:

Connecticut
Delaware
Georgia
Indiana
Kentucky
Louisiana
North Carolina
Ohio

States following state rules similar to Daubert:

Alabama
Arkansas
Colorado
Hawaii
Idaho
Iowa
Maine
Montana (applies only to “novel” evidence)

⁴ See generally, The Expert and Daubert (Spring 1996 Issue of Mac News Letters), <http://www.mac-experts.com/macnewsletters/spring96/daubert.htm>.

⁵ Id.

⁶ Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579 (1993).

Oklahoma	Nevada
Oregon	Texas
Rhode Island	Utah
South Dakota	
Tennessee	
Vermont	
Washington	
West Virginia	
Wyoming	

18 states, including California, continue to apply the Frye rule, although at least one of those states suggests using Daubert's factors as a guide to determining "general acceptance" of the proffered evidence.

States applying the Frye rule:

- Alaska
- Arizona
- California
- Florida
- Illinois
- Kansas
- Massachusetts (Daubert factors as guide to application of Frye rule)
- Maryland
- Michigan
- Minnesota
- Mississippi
- Missouri
- Nebraska
- New Hampshire
- New Jersey
- New Mexico
- New York
- Pennsylvania

The remaining four states have rejected both the Daubert and Frye standards in favor of their own unique tests requiring a case-by-case determination of the reliability or relevancy of the proffered evidence. North Dakota applies a pure "relevancy standard;" South Carolina examines the "reliability of the evidence;" Virginia tests the "reliability of the scientific technique," and, Wisconsin applies a "relevancy test."

Kumho Tire, in Brief

The U.S. Supreme Court's recent decision in Kumho Tire v. Carmichael, 119 S.Ct. 1167 (1999) shocked lawyers and judges alike. The decision announced what appears to be a rather sweeping dismissal of Daubert's formulaic approach. Kumho Tire clarified that Daubert's four factors were "meant to be helpful, not definitive. Indeed, those factors do not all necessarily

apply even in every instance in which the reliability of expert testimony is challenged.” Kumho Tire at p. 9. Furthermore, the Daubert factors should only be considered in those cases where the trial court determines that “they are reasonable measures of the reliability of expert testimony.” Id. Thus, the trial court has extremely broad discretion to determine the applicable measure of the reliability of expert testimony in each specific case. “[T]he law grants a district court the same broad latitude when it decides how to determine reliability as it enjoys in respect to its ultimate reliability determination.” (Emphasis added) Id. at 3.

North Carolina’s Test: Pre- and Post- *Kumho Tire*

Rule 702 of the North Carolina Rules of Civil Procedure governs the admissibility of all expert evidence in our State courts. The pertinent part of the Rule provides that, “If scientific, technical or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion.” The text is identical to the Federal Rule interpreted by the U.S. Supreme Court in Daubert v. Merrell Dow Pharmaceuticals, 509 U.S. 579 (1993). Daubert set forth a list of factors useful in determining the admissibility of scientific evidence: testing; peer review; analysis of error rates; and acceptance in the relevant scientific community. North Carolina courts have clarified that in this jurisdiction “[t]he expert’s scientific technique on which he bases his opinion must be such that its accuracy and reliability has become established and recognized. *However, the focus is on the reliability of the scientific method rather than its establishment and recognition.*” (Emphasis added) State v. Huang, 99 N.C. App. 658, 394 S.E.2d 279 (1990), *vacated in part*, 107 N.C. App. 710, 421 S.E.2d 812 (1992).

Below is a summary of recent Daubert motions and rulings in North Carolina’s State and Federal Courts. Contact information is available upon request. The authors are grateful to our fellow trial lawyers for sharing their Daubert experiences.

State Court In a case against a doctor and HMOs in Raleigh, North Carolina the defense moved to exclude HMO experts based upon Daubert. The case settled before the judge ruled on the motions.

Judge Jerry Tillett in Manteo, North Carolina suppressed a rape expert from South Carolina in a capital case.

Judge David LaBarre in Durham, North Carolina suppressed the prosecution’s arson expert in a capital case. The state took a dismissal following the exclusion.

An economic expert’s testimony regarding projection of lost profits in two business context cases has been excluded under Daubert by Judge Ben Tennille (Catawba County) and Judge Lynn Johnson (Johnston County).

Federal Court EDNC: Judge Britt denied four (4) Daubert motions by defense counsel without stating the grounds for the denials. The witnesses were to have opined about advertising claims which were supposedly scientifically based.

MDNC: Judge Tilley's recent ruling in Marsh v WR Grace, CA Nos 3:90CV00613, #:91CV00047 and 3:91CV0048 is currently on appeal to the 4th Cir. The Judge granted Summary Judgment and rejected expert testimony, citing the failure to meet Daubert standards. He focused on the failure of the expert to identify a process by which the expert eliminated alternative causes of the alleged condition.

Federal Assorted Judge Howard (EDNC) and Judge Thornburg (WDNC) have granted Summary Judgment in back bone screw cases. Their rulings were based partly on causation, but without specific reference to the Daubert standards. Judge Osteen excluded a penile plethysmograph expert some years ago in a criminal child pornography case.

Following the advent of the Kumho Tire opinion, North Carolina courts have applied two different approaches to scientific testimony. In June of 1999, one month after the publication of Kumho Tire, the North Carolina Court of Appeals handed down State v. MacCardwell, 516 S.E.2d 388. The MacCardwell decision indicates that in cases where the scientific method is relatively new, reliability is generally established by expert testimony rather than by judicial notice, and the trial court may consider several factors in determining reliability. Among the factors is the general acceptance of the technology by the scientific community, but lack of general acceptance is not dispositive. Other factors which the trial court may consider include:

(1) the expert's professional background; (2) independent research conducted by the expert; (3) the use of established techniques; and (4) explanatory testimony (including, for example, the "use of visual aids before the jury so that the jury is not asked 'to sacrifice its independence by accepting [the] scientific hypotheses on faith'").

MacCardwell at p. 395. Interestingly, the court cited the Daubert factors as contradictory to the potential factors listed by the court.

Two months after MacCardwell was published, the Court of Appeals handed down State v. Underwood, 1999 WL 617608. Any mention of MacCardwell or its factors is conspicuously absent from Underwood. After reaffirming that a new scientific method is admissible into evidence if it is reliable, the Court of Appeals again endorses the Daubert factors. The opinion stresses that North Carolina emphasizes the reliability of the scientific method rather than its popularity within the scientific community, but goes on to state that "[w]hen no specific precedent exists, scientifically accepted reliability justifies admission of the testimony ... and such reliability may be found either by judicial notice or from the testimony of scientists who are expert in the subject matter, or a combination of the two." Underwood, *supra*.

Neither MacCardwell nor Underwood has been reviewed by our Supreme Court. We will have to wait and see which approach ultimately prevails. Both opinions, however, appear to embrace a more flexible test for the admissibility of scientific evidence -- and much broader discretion on the part of the trial court -- than rigid adherence to Daubert would allow.

Daubert in the wake of Kumho Tire

Following the Daubert decision there was widespread disagreement as to whether Daubert applied only to scientific testimony or whether it applied to all expert testimony. There was also disagreement as to whether Daubert applied to “experience-based testimony” as opposed to testimony based on research.

Those questions were answered by the United States Supreme Court this year in Kumho Tire vs. Carmichael. Kumho grew out of a serious car crash that was caused by a tire blowout.

The Plaintiffs contended that the blowout was caused by a defect in the tire and offered expert testimony in support of their contention. The Defendants moved to exclude the testimony of the Plaintiffs’ expert based on Daubert. The court excluded the expert’s testimony and then granted summary judgment for Defendants. Plaintiffs appealed contending that Daubert did not apply to experience-based technical opinions. The Supreme Court disagreed and held that the trial judge’s Daubert gatekeeping obligation applied not only to scientific testimony, but to *all* expert testimony based on scientific, technical or other specialized knowledge. The court based its conclusion on the fact that Rule 702 makes no distinction between “Scientific”, “technical” and “other specialized” knowledge. Thus, Daubert’s “gatekeeping” requirement applies to any testimony offered pursuant to Rule 702, even experience-based testimony.

What makes the decision so potentially harmful for plaintiffs is the wide discretion given trial judges to determine not only whether the proffered testimony is reliable, but also the method used to determine reliability as well. The Court held that the rules grant a district court the same broad latitude when it decides how to determine reliability as it enjoys in respect to its ultimate reliability determination.

According to the Court, the objective of the gatekeeping role is to make certain that an expert, whether basing testimony upon professional studies or personal experience, employs the same level of intellectual rigor in the courtroom that characterizes the practice of an expert in the relevant field. Where the factual basis of the opinion, the data, principles, methods or their application is sufficiently called into question, the trial judge must determine whether the testimony has a reliable basis in the knowledge and experience of the relevant discipline. The trial court must determine not whether the methodology is useful or reliable in general, but that it is reliable *when applied to the specific issue involved in the case*.

Appellate review of the trial judge’s decision both as to whether the testimony is reliable and how to determine whether it is reliable is pursuant to the abuse of discretion standard.

It seems reasonable to assume that, just as many state courts adopted Frye and then Daubert, Kumho Tire will eventually gain widespread acceptance among most state courts. A recent Ninth Circuit decision reiterated the holding of Kumho Tire and endorsed the use of Daubert in the evaluation of non-scientific evidence by state trial courts. Stating that the trial courts have broad discretion in determining reliability, the federal court held that a trial court *may* apply the Daubert factors to non-scientific testimony where the court feels that the factors

would be helpful. Volk v. U.S., — F.Supp.2d — , 1999 WL 504829 (N.D.Cal. May 28, 1999). Therefore, because the state courts are familiar with its analysis, Daubert will likely come into play from time to time where PET Scan results are offered into evidence. As trial attorneys we must have a thorough understanding of how Daubert and Kumho Tire may be used both as a shield and a sword by plaintiffs. An example of how significantly Kumho can affect plaintiffs is a recent decision by the Fifth Circuit in Black vs. Food Lion. There the court overturned a \$300,000 judgment in favor of the Plaintiff, who claimed to have fibromyalgia as a result of a fall in a grocery store. The Fifth Circuit held that the testimony of the Plaintiff's physician regarding the cause of her fibromyalgia should have been excluded because there was no scientific basis for the proposition that trauma causes fibromyalgia.

In contrast, I recently used Daubert to exclude portions of a neuropsychologist's testimony that my client was malingering based on the results of the Lees-Hailey Malingering Scale. The neuropsychologist was unable to establish the reliability of the test based on the Daubert factors.

Do PET Scans Meet the *Daubert* Criteria?

- Is PET scanning based on a testable theory or technique?

There appears to be little doubt that a court considering the first of the four factors set forth by the Court in Daubert would conclude that PET scans are based on a testable theory or technique. PET scanning is based on well accepted and thoroughly tested nuclear imaging principles.

- Has PET scanning for the diagnosis of brain injury been subjected to peer review and publication?

There is a rapidly growing body of peer reviewed literature about the use of PET in the diagnosis and management of patients with a wide variety of disorders. A Medline search revealed numerous journal articles describing the use of PET and SPECT in the diagnosis of TBI. The vast majority of the literature supports the premise that PET is a useful diagnostic tool in the diagnosis of TBI.

- Has the known or potential rate of error been established?

Sensitivity refers to the ability of a diagnostic process such as CT, MRI or PET scanning to detect the presence of small abnormalities.⁷ Specificity refers to the capacity of the diagnostic process to determine the particular types of abnormalities detected, and to differentiate between various types of abnormalities.⁸ Recent studies comparing the sensitivity

⁷ Gucalp, et al., "Overview by an Oncologist: What are the Imaging Needs of the Oncologist and Oncological Surgeon?" 27 Semin. Nucl. Med. 1, 3-9 (1997).

⁸ Id.

and specificity of PET scans with the sensitivity and specificity of conventional diagnostic tools, such as CT and MRI scans, for detecting malignant abnormalities have found PET scans to be superior in terms of sensitivity and comparable if not superior in terms of specificity.⁹

- Has the use of PET scanning in the diagnosis of TBI gained general acceptance within the scientific community?

The merits of the “general acceptance” standard in Frye has been debated and criticized by commentators for years. Generally accepted by whom? If a new technique or theory has been accepted by 9 of the 10 top researchers in a field but has not yet been assimilated into routine practice is it “generally accepted”? How does a proponent of evidence establish general acceptance in the field? The history of science is filled with theories that were once widely accepted but were subsequently proved to be false. Does general acceptance in a field necessarily establish reliability?

Based on the volume of current literature and the number of investigators studying the use of PET in the diagnosis of brain injury it appears that the clinical use of PET is rapidly gaining general acceptance within the medical community. The use of PET for the diagnosis of mild TBI has not yet gained widespread clinical acceptance, in part due to the limited availability of PET equipment and resultant high cost of PET scans. Health insurers are likely to deny benefits for PET scans in cases involving mild TBI based on claims it is “experimental.”

Any attorney seeking the admission of PET scans following head trauma should be familiar with the Practice Statement on PET adopted by the American Academy of Neurology (Neurology, February 1991, Vol. 41:163-167). According to the Practice Statement, “The role of PET in the evaluation of head trauma has not been established.” Given the age of the Practice Statement (it was adopted May 5, 1990), its conclusions are of questionable current value. However, defense counsel will surely cite the Practice Statement as evidence PET is not reliable in the diagnosis of brain injury. Hopefully, the Academy will revisit its position on PET and head trauma in the near future as much research on the subject has accumulated in the last 9 years.

Case Survey

⁹ Rinne, et al., “Primary Staging and Follow-up of High Risk Melanoma Patients with Whole-body 18F-fluorodeoxyglucose Positron Emission Tomography: Results of a Prospective Study of 100 Patients,” 82 *Cancer* 9, 1664-71 (1998); and, Holder, et al., “Effectiveness of Positron Emission Tomography for the Detection of Melanoma Metastases,” 227 *Ann. Surg.* 5, 764-9 (1998).

There are few reported decisions which have directly addressed the admissibility of PET scans. The only pre-Daubert decision is the 1992 New York case of People v. Weinstein, 156 Misc. 2d 34, 591 N.Y.S.2d 715, a criminal case in which the court held PET scan results to be admissible evidence. The court reasoned that the Frye standard should be inapplicable in a criminal trial where the Defendant raises an insanity defense. According to the court, any evidence relevant to the insanity defense should be admitted if it meets a reasonableness standard. Relying upon expert testimony and published studies, including one from the Journal of Nuclear Medicine^{10,11}, the court stated in dicta that PET is a generally accepted means of imaging brain function, but the formulae used to analyze PET results are not generally accepted within the scientific community as a whole. While the formulae used to quantify PET data are not generally accepted, they are routinely used by PET experts who rely upon the results produced by the formulae in making diagnoses. Therefore, experts can reasonably use the formulae and results derived from the formulae in developing opinions.

Clearly, the reasoning of the Weinstein court supports the admission of PET scans under the Daubert rule. Several post-Daubert federal cases address the admissibility of PET scans. The earliest of these decisions is Hose v. Chicago Northwestern Transportation Company, 70 F.3d 968 (1995). In Hose the United States Court of Appeals for the Eighth Circuit held that the trial court did not abuse its discretion in admitting PET scan results into evidence where Plaintiff's treating physician and expert witness had relied on the results to exclude alternative causes of Plaintiff's injury which alternatives had been argued by the defense. The court went on to note that,

There is no question that the PET scan is scientifically reliable for measuring brain function. The fact that [plaintiff's] treating physician ordered the PET scan prior to the initiation of litigation is another important indication that this technique is scientifically valid. Cf. Daubert [citation omitted](expert testimony based on "legitimate, preexisting research unrelated to the litigation provides the most persuasive basis" for ensuring scientific validity of expert testimony).

Hose does not stand for the proposition that PET scan technology is so reliable as to render PET scan results automatically admissible in every case. In June of 1997, the Eighth Circuit Court of Appeals handed down its decision in Penney and Penney v. Praxair, Inc., 116 F.3d 330. The appellate court sustained the trial court's holding that the Plaintiff failed to

¹⁰ *Brooks, et al., "Test-Retest Studies of Cerebral Glucose Metabolism Using Fluorine-18 Deoxyglucose: Validation of Method," 28 Journal of Nuclear Medicine 53 (1987).*

¹¹ For more recent studies, See Ruff, et al., "Computerized Tomography, Neuropsychology, and Positron Emission Tomography in the Evaluation of Head Injury," 2 *Neuropsychiatry, Neuropsychology, and Behavioral Neurology* 2 (1989), and Society of Nuclear Medicine Brain Imaging Council, "Ethical Clinical Practice of Functional Brain Imaging," 37 *Journal of Nuclear Medicine* 7 (1996).

establish a foundation sufficient to justify admission into evidence of Plaintiff's PET scan results. The court's primary concerns were Plaintiff's advanced age and ingestion of regular doses of heart medication throughout the testing period. Those factors were not present in the control group against which Plaintiff's PET scan results were measured. The court stated that it was not clear whether the factors had any impact on the results, but that Plaintiff had failed to carry his burden of establishing a reliable foundation for his PET scan readings. According to the court, the risk that the jury would misapply the PET scan results outweighed the evidence's potential to help the jury decide issues regarding Plaintiff's injury. The court acknowledged Penney's apparent inconsistency with Hose, stating that admissibility of PET scan results must be decided on a case-by-case basis.

In September, 1997, the United States Court of Federal Claims addressed the admissibility of PET scans for the first time. Barnes v. Secretary, Department of Health and Human Services, 1997 WL 620115(Fed.Cl.), was a special multi-district proceeding brought by plaintiffs claiming injury from the disease Tuberos Sclerosis ("TS") in actions authorized by the National Childhood Vaccine Injury Act, 42 U.S.C. 300aa-1 et seq. In Barnes, as in Timothy McCollum and Lee Ann McCollum as Parents and Natural Guardians of Grant F. McCollum, 1998 WL 338237 (Fed.Cl.), also an action under the National Childhood Vaccine Injury Act, the Federal Claims Court considered expert testimony regarding brain injury based upon PET scan evidence without any mention of Daubert. The Barnes decision made no observations as to the methodology of or theory behind PET scans, but merely referred to the PET scan evidence. The McCollum decision simply cited the doctor's testimony that, "PET scanning is a method by which metabolic activity in cells can be assessed," before discussing the PET scan results. The implication of the treatment of PET scan evidence by the Barnes and McCollum cases is that PET scans constitute "scientific knowledge" of brain injury and are therefore presumptively admissible under Daubert so long as they are relevant to a material issue in the case.

The 1997 case of Jackson v. Calderon, Warden of California State Prison at San Quentin, 1997 WL 855516 (D.D.Cal.), held PET scan results inadmissible for the limited purpose of diagnosing chronic use of the drug PCP. There had been only one study on PET scans of persons with a history of abusing PCP, and that study involved only seven patients. The court found insufficient evidence to substantiate the reliability of PET scan technology to determine PCP abuse. Jackson is notable because of expert testimony that "PET is only recognized as a clinical instrument for the diagnosis and treatment of three specific conditions: brain tumors, dementia (including Alzheimer's disease), and epilepsy." That assertion was purportedly based upon the American Academy of Neurology's position paper, discussed above. In stating its holding, the court declined to mention the expert testimony as to the limited accepted uses of PET technology. Rather, the court found that the study of PET scans of individuals with a history of PCP abuse was an unpublished study not subjected to peer review. The court stated that its finding justified the exclusion of the evidence under Daubert.

Conclusion

It is imperative that counsel seeking to admit PET Scan results into evidence retain a qualified expert to interpret the data. The expert should demonstrate command of the technical

aspects of the technique and familiarity with the literature supporting the use of PET in the diagnosis of brain injury. Testing should be conducted in accordance with the guidelines established by the Society of Nuclear Medicine Brain Imaging Counsel in its position paper titled “Ethical Clinical Practice of Functional Brain Imaging.”

Today PET fares well in an analysis under the Daubert factors. Continuing research into PET will no doubt increase publication, ease the burden of establishing peer review, and clarify the known or potential error rate of the technology. The current case law reflects favorably on the use of PET to diagnose and determine the extent of brain injury. Overall the cases support the admission of PET scan results under Daubert. The only exceptions are where special circumstances surround the testing, as in Penney, or where the results are offered for some unique purpose, as in Jackson.

PET scanning is emerging from the “twilight zone” of evidence as a new day dawns in the diagnosis and treatment of Traumatic Brain Injury.