

I23 Brain Imaging in Death Penalty Mitigation

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Learning Overview: After attending this presentation, attendees will have learned about various types of brain imaging and the evolving application in criminal cases and will have a better understanding of how to be sensitive to the possibility of mitigation and the appropriate use of experts.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by increasing understanding of the possibilities, use, and misuse of brain imaging techniques as they apply to criminal defenses.

Brain imaging techniques, such as Magnetic Resonance Imaging (MRI), Computed Tomography (CT) scans, functional MR imaging, diffusion tensor imaging, perfusion imaging, Positron Emission Tomography (PET), and Single-Photon Emission Computed Tomography (SPECT), have increasing applications in clinical settings

Increased reporting in the peer-reviewed literature and clinical evidence has demonstrated sensitivity and specificity for even the more recent techniques, such as Diffusion Tensor Imaging (DTI). In regard to its use in evaluations of Traumatic Brain Injury (TBI), Hulkower noted, “Despite significant variability in sample characteristics, technical aspects of imaging, and analysis approaches, the consensus is that DTI effectively differentiates patients with TBI and controls, regardless of the severity and timeframe following injury. Furthermore, many have established a relationship between DTI measures and TBI outcomes.”¹

Increasing advances in brain imaging will compel the legal system to determine which imaging techniques have probative value from prejudicial and misleading ones.

The track record for the success of functional neuroimaging in exculpating specific-intent crimes, such as murder, is not a good one. However, presentation of functional brain imaging has fared better in the mitigation of the death penalty in some capital offenses.

In November of 2002, just five months out of prison, 32-year-old Coy Evans was charged with first-degree murder of a police officer, two counts of armed robbery, armed burglary, kidnapping, and possession of a firearm by a convicted felon. Evans was later convicted of fatally shooting Sgt. Dale Green, a 13-year veteran of the Tallahassee police department, while the officer was investigating a home-invasion robbery. The jury spared Evans from the death penalty. A Single-Photon Emission Computerized Tomography (SPECT) brain scan may have been a factor in the jury’s decision

Approximately 44% of the neurobiological (genetic/neurological) claims raised were attempts to mitigate sentencing.² Failing to adequately investigate the probability of a brain abnormality may constitute ineffective assistance of counsel. Failure to obtain brain imaging studies in a first-time older offender may be an example, given increasing evidence that the behavioral variant of frontotemporal dementia may be a factor in their offending.

The defense (in plaintiff cases) and the prosecution (in criminal cases) have generally been successful at portraying much brain imaging evidence as “junk science.”³ However, in 2018, the United States District Court for the Southern District of Florida ruled that DTI satisfied the *Daubert* standard for admissibility in *Marsh v. Celebrity Cruises, Inc.*, a personal injury claim for mild traumatic brain injury. The Court concluded that a lack of a standardized protocol for the acquisition and interpretation of DTI results did not make DTI technology “junk science” nor render the opinions of a board-certified neuroradiologist unreliable. In arriving at their opinions, the Court appears to overlook elements of *Daubert*, (i.e., known or potential error rate; the existence and maintenance of standards controlling its operation; and possibly whether it has attracted widespread acceptance within its relevant scientific community). This lack of adherence to established evidentiary standards has not stopped the increasing use of DTI in the courtroom.

Reference(s):

1. Hulkower, M.B. et al. A Decade of DTI in Traumatic Brain Injury: 10 Years and 100 Articles Later. *AJNR Am J Neuroradiol* 34:2064–74 Nov 2013. www.ajnr.org.
2. Farahany, N.A. Neuroscience and behavioral genetics in US criminal law: An empirical analysis. *Journal of Law and the Biosciences*, 485–509. doi:10.1093/jlb/lsv059 (2016).
3. Andrew Lehmkuhl. Diffusion Tensor Imaging: Failing *Daubert* and Fed. R. Evid. 702 in Traumatic Brain Injury Litigation, 87 *U. Cin. L. Rev.* 279 () Available at: <https://scholarship.law.uc.edu/uclr/vol87/iss1/9>.
4. *Marsh v. Celebrity Cruises, Inc.*, Case No. 1(17-CV-21097-UU).

Brain Imaging, Mitigation, *Daubert*