Life, Death, and Neuroimaging: The Advantages and Disadvantages of the Defense's Use of Neuroimages in Capital Cases –Lessons from the Front

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I. INTRODUCTION

Over the past several decades, commentators and scholars from the medical, legal, and social science fields have produced a massive body of literature on the intersection of law and neuroimaging.[1] Earlier writings focused on explaining various new techniques for developing brain images, exploring how such images might be relevant in legal proceedings, and addressing evidentiary issues posed by the use of such images in court.[2] More recent publications correspond with a vast

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1. *See, e.g.*, Susan A. Bandes, *The Promise and Pitfalls of Neuroscience for Criminal Law and Procedure*, 8 OHIO ST. J. CRIM. L. 119, 119 (2010) ("The explosion of knowledge in cognitive neuroscience over the past decade has been stunning.").

2. *See, e.g.*, Jennifer Kulynych, *Psychiatric Neuroimaging Evidence: A High-Tech Crystal Ball?*, 49 STAND. L. REV. 1249, 1250 (1997) ("This note explores the thorny evidentiary issues posed by neuroimaging in the context of psychiatric diagnosis, an area in which standards for admitting expert testimony are poorly articulated.").

expansion of research and funding in the area of neuroscience and address a wide variety of topics, such as the use of neuroimaging to detect deception,[3] predict recidivism and future dangerousness,[4] explain the effects of trauma and mental illness,[5] gather information from international terrorists,[6] and even predict whether a person has a general propensity for violence.[7] Other, more cautionary pieces have raised questions about the ethical implications as well as the financial, social, and moral costs associated with the use of neuroimaging in these contexts.[8]

In this Article, we examine the use of neuroimaging in capital cases with a practical, case-based perspective and conclude that brain imaging can be an important, helpful, and successful tool for capital defenders, but there are serious risks that must be considered before determining whether to employ these techniques. Drawing on examples from our own practice, we discuss the role neuroimaging can play in capital cases. More importantly, however, we also discuss the pros and cons of the defense's use of neuroimaging in these cases. Our take-home message is that neuroimaging is *never* the first option in a capital case, and it should only be considered after (1) a comprehensive social history investigation has been conducted; (2) a comprehensive neuropsychological battery of tests has been administered to the client; and (3) the client

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3. *See generally, e.g.,* Margaret Talbot, *Duped: Can Brain Scans Uncover Lies?*, NEW YORKER, July 2, 2007, at 52.

4. *See, e.g.*, David M. Eagleman, *Neuroscience and the Law*, 45 HOUS. LAW, Apr. 2008, at 36, 37 ("Can neuroscience inform sentencing guidelines by offering better prediction of recidivism?"). *See generally* J.W. Looney, *Neuroscience's New Techniques for Evaluating Future Dangerousness: Are We Returning to Lombroso's Biological Criminality?*, 32 U. ARK. LITTLE ROCK L. REV. 301 (2010).

5. *See generally* Lydia D. Johnson, *Guilty or Innocent? . . . Just Take a Look at My Brain–Analyzing the Nexus Between Traumatic Brain Injury and Criminal Responsibility*, 37 S.U. L. REV. 25 (2009).

6. *See generally* Jonathan H. Marks, *Interrogational Neuroimaging in Counterterrorism: A "No Brainer" or a Human Rights Hazard?*, 33 AM. J.L. & MED. 483 (2007); Jennifer Wild, *Brain Imaging Ready to Detect Terrorist, Say Neuroscientists*, 437 NATURE 457, 457 (2005).

7. *See* O. Carter Snead, *Neuroimaging and the "Complexity" of Capital Punishment*, 82 N.Y.U. L. REV. 1265, 1266 n.2 (2007) (internal quotation marks omitted) (discussing an article in the New York Times Magazine that predicted "brain scanning to identify criminal suspects" would be a topic that the Supreme Court of the United States may be called upon to address in the future).

8. *See, e.g.*, Michael L. Perlin, *"And I See Through Your Brain:" Access to Experts, Competency to Consent, and the Impact of Antipsychotic Medications in Neuroimaging Cases in the Criminal Trial Process*, 2009 STAN. TECH. L. REV. 4 ¶¶ 25-43 (2009) (raising ethical considerations related to a criminal defendant's competency to consent to the imposition of a neuroimaging test or examination, and the impact of antipsychotic medications at the time that such a test is performed).

has been evaluated by a neuropsychiatrist or neurologist who is familiar with neuropsychological testing and its social history and who is sensitive to the dangers of neuroimaging. In sum, neuroimaging is not an investigative tool; it is a confirmatory and explanatory tool (and even then, only in the right case). Part II of this Article briefly describes some of the most commonly used imaging techniques in capital cases. Part III uses a case example to illustrate how a carefully crafted mitigation story can successfully incorporate cutting-edge brain imaging. Part IV, however, describes some potential disadvantages and risks we have experienced. Part V concludes this Article with a brief list of practical "lessons from the front."

II. BACKGROUND: TYPES OF NEUROLOGICAL TESTING USED IN CAPITAL CASES

Others have already written extensively and aptly about the variety of neuroimaging techniques that exist, how the techniques work, and the pros and cons of each technique.[9] By way of background, we offer a brief summary of the testing methods most commonly used in capital cases.

A. Nonimaging Methods of Testing

Long before neuroimaging became common, there were–and still are–a variety of nonimaging testing methods available to measure brain dysfunction.

1. Neuropsychological Assessment. Neuropsychological assessment is a method–and, we submit, the most reliable method–for acquiring data about a subject's cognitive, emotional, and executive functions.[10] Neuropsychological tests use specifically designed tasks to measure a psychological function that is known to be linked to a particular brain structure or pathway. Some of the major domains of functioning that can be assessed with neuropsychological testing include: (1) attention and concentration; (2) visual perception and reasoning; (3) memory; (4) learning; (5) verbal functions; (6) academic skills; (7) construction; (8) concept formation; (9) self-regulation and motor ability; and (10) emotional status. An expert making a neuropsychological assessment often gives a battery of commonly used tests to measure each of the major domains.[11] The subject's raw score on each test is typically

9. *See generally* Kulynych, *supra* note 2.
10. MURIEL DEUTSCH LEZAK, NEUROPSYCHOLOGICAL ASSESSMENT 20 (3d ed. 1995).
11. *Id.* at 121-22.

compared to a general-population normative sample that should ideally be drawn from a population comparable to the person being examined.[12] Normative studies frequently provide data stratified by age, level of education, or ethnicity. In addition to individual testing, a neuropsychological assessment may also focus on a person's psychological, personal, interpersonal, and wider contextual circumstances.

2. Neurological Evaluation. A neurological evaluation is a clinical assessment aimed at detecting any abnormalities that may be related to a dysfunction in the nervous system.[13] The evaluation is generally conducted by a specialist in neurological disorders, such as a neurologist or a neurosurgeon, depending on the disorder in question. A neurological evaluation may include up to three general components: (1) a review of the individual's medical and social history, including any present medical complaints; (2) a general neurological examination; and (3) diagnostic testing focused on the nervous system.[14] The neurological exam is a physical examination focused on the parts and functions of the body that are most often impacted by a problem in the central nervous system. It may include an examination of the head and neck, cranial nerves, motor skills, reflexes, coordination and gait, and sensory abilities. After a review of the individual's history and present functioning, more targeted diagnostic testing can be used to help detect or confirm a suspected pathology.[15] Diagnostic testing can include neuroimaging, but the testing may also consist of nonimaging techniques, such as nerve conduction studies, blood tests, testing of spinal fluid, and biopsy or removal of tumors.

3. Neuropsychiatric Evaluation. Much like a neuropsychological evaluation, a neuropsychiatric evaluation is intended to measure cognitive and mental functioning, but the latter focuses more specifically on mental disorders associated with diseases of the nervous system. Neuropsychiatry is a subspecialty of psychiatry rooted in the idea that psychiatric symptoms are traditionally often linked with specific brain structures and abnormalities. A neuropsychiatric evaluation can be performed by a neuropsychiatrist or by a traditional psychiatrist who seeks referrals for additional neurological testing to compliment the psychiatric evaluation.

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12. *Id.* at 98-99.
13. *See* BERNARD J. ALPERS & ELLIOTT L. MANCALL, ESSENTIALS OF THE NEUROLOGICAL EXAMINATION 1-32 (4th ed. 1975).
14. *See id*. (discussing appropriate steps for a complete neurological evaluation).
15. *Id.*

B. Structural Imaging

Structural imaging produces digital representations of the brain's anatomical makeup.[16] "The two principal techniques for structural neuroimaging are computed tomography (CT) scanning and magnetic resonance imaging (MRI)."[17] Professor Snead, in his paper entitled *Neuroimaging and the 'Complexity' of Capital Punishment*, provides an accurate and succinct description of these two techniques:

> CT scanning, introduced in 1972, uses x-rays and a computerized algorithm to reconstruct an image of the brain. CT scanning has been largely supplanted by MRI, which has superior spacial resolution. MRI constructs a computerized image of the brain by measuring the signal strengths of the various radio frequencies emitted by the proton nuclei of atoms in brain tissue when the protons are placed in a strong magnetic field.[18]

C. Functional Imaging

Functional images, which depict the brain in action, include positron emission tomography (PET) scans, single-photon emission computed tomography (SPECT) scans, and functional MRI (fMRI) scans.[19] All three methods "show activity within the brain by tracing the location or concentration of various molecules."[20] One commentator has explained,

> These technologies allow living brains to be observed, both as their shape changes over time and as they function, by watching the location and timing of glucose and oxygen consumption. These functional capabilities are allowing researchers to watch what areas of the brain are in greater or lesser use as test subjects use their brains–for movement, for sensation, for emotion, or for thought.[21]

D. Comparison Analysis

The traditional mode of neuroimaging analysis has been a visual review of the scan films by a radiologist or a neurologist. This method creates a number of problems related to subjectivity, bias, and error, which we discuss more fully below. The films or scans are generated

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16. Snead, *supra* note 7, at 1281.
17. *Id.*
18. *Id.* (footnotes omitted).
19. Henry T. Greely, *Neuroethics and ELSI: Similarities and Differences*, 7 MINN. J. L. SCI. & TECH. 599, 612 (2006).
20. *Id.* (emphasis omitted).
21. *Id.* at 612-13.

from the underlying computer data, which is generally known as the "dicom." A growing number of research centers have developed methods for quantitatively analyzing the dicom for (a) a more precise analysis of the brain structure and function and (b) a more sophisticated analysis by comparison with a known set of "normal" or "abnormal" brains.[22] In essence, quantitative analysis allows very precise computer algorithims to analyze the data generated during the imaging study. Rather than having a radiologist examine the film to see if the brain looks normal (for example, whether various brain structures are the right size and shape) or is generally functioning properly, a computer analyzes the data. Quantitative analysis results in a more precise–and, it is hoped, more accurate–determination of whether the brain is structurally and functionally normal. Furthermore, quantitative anslysis can permit a comparison of an individual client's brain to a database of brains with known abnormalities (such as schizophrenia).[23]

III. NEUROIMAGING CAN HELP MAKE A DIFFERENCE BETWEEN LIFE AND DEATH

A. *Understanding the Mitigation Story*

In order to explain what role neuroimaging can play in a mitigation presentation, we must first briefly explain the purpose and function of mitigation. A capital trial proceeds in two basic parts.[24] During the guilt-or-innocence phase, the jury determines whether the State has met its burden of proving that the defendant committed the alleged crime beyond a reasonable doubt.[25] If the jury finds the defendant guilty of the capital crime, the case proceeds into a penalty phase, during which the jurors hear evidence of aggravation from the State along with any evidence in mitigation that the defense team offers for the jury's consideration.[26] "Unlike the decision the jurors made during the guilt-or-innocence phase of the proceedings, however, this decision is not, at

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22. *See, e.g.,* Raquel Gur et al., *Regional Brain Function in Schizophrenia: I. A Positron Emission Tomography Study*, 44 ARCHIVES GEN. PSYCHIATRY 119, 124 (1987); Ruben Gur et al., *Sex Differences in Regional Cerebral Glucose Metabolism During a Resting State*, 267 SCIENCE 528, 531 (1995); J. Daniel Ragland et al., *PET Regional Cerebral Blood Flow Change During Working and Declarative Memory: Relationship With Task Performance*, 11 NEUROPSYCHOLOGY 222, 229-30 (1997).

23. *See* Gur et al., *Regional Brain Function in Schizophrenia*, *supra* note 22, at 124.

24. Bruce J. Winick, *The Supreme Court's Evolving Death Penalty Jurisprudence: Severe Mental Illness as the Next Frontier*, 50 B.C. L. Rev. 785, 848 (2009).

25. *Id.*

26. *Id.*

its core, a determination of fact, for example, did the defendant 'do it,' but a moral and normative choice–does he deserve to die?"[27] This decision will largely turn on whether the jurors are persuaded by the defendant's mitigation story.[28] In the thirty-four years since the Supreme Court of the United States first mandated individualized sentencing in capital cases,[29] courts and commentators have employed a host of definitions to explain the meaning of the word "mitigation."[30] Russell Stetler, National Mitigation Coordinator for the federal death penalty projects, has described mitigation as "the empathy-evoking evidence that attempts to humanize the accused killer in death penalty cases" and as a mysterious phenomenon with the "transformative capacity to enable jurors to feel human kinship with someone whom they have just convicted of an often monstrous crime."[31] In the context of explaining an expert's role in evaluating and presenting evidence of a mental disability or condition in a capital case, Stetler suggests that it is instructive to think in terms of what mitigation is *not*:

> Mitigation is *not* a defense to prosecution. It is not an excuse for the crime. It is not a reason the client should "get away with it." Instead, mitigation is a means of introducing evidence of a disability or condition which inspires compassion, but which offers neither justification nor excuse for the capital crime. Unlike the insanity and competency requirements, mitigation need not involve a mental "disease" or "defect." Mitigation does not require a diagnosis. The expert who assists a capital defense team is not there either for the traditional forensic purpose (assessing competency and/or responsibility) or for the routine goals of a clinician (diagnosis in order to prescribe treatment). If the expert testifies, it may simply be to help jurors appreciate the world as the client experiences it.
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> Mitigation provides the biography of mental disability. It explains the influences that converged in the years, days, hours, minutes, and seconds leading up to the capital crime, and how information was

27. John H. Blume, et al., *Competent Capital Representation: The Necessity of Knowing and Heeding What Jurors Tell Us About Mitigation*, 36 HOFSTRA L. REV. 1035, 1035 (2008).

28. *Id.* at 1037-38 (explaining that empirical evidence shows that the mitigation presentation heavily influences jurors' views on what is most important in deciding whether to sentence a particular defendant to death or life imprisonment).

29. *See* Gregg v. Georgia, 428 U.S. 153, 199 (1976) (holding that Georgia's reenacted death penalty statute is constitutional in part because it allows for mercy based on individualized consideration).

30. *See* Craig Haney, *Taking Capital Jurors Seriously*, 70 IND. L.J. 1223, 1229 (1995).

31. Russell Stetler, *The Mystery of Mitigation: What Jurors Need to Make a Reasoned Moral Response in Capital Sentencing*, 11 U. PA. J.L. & SOC. CHANGE 237, 237 (2008).

> processed in a damaged brain. It is a basis for compassion–not an excuse.[32]

Others have spoken of mitigation in terms of telling the defendant's story: "credibly telling the defendant's story can make the difference between life and death."[33] To demonstrate how neuroimaging can be a successful piece of the mitigation story, we employ a hypothetical case study.[34] Our hypothetical looks at the case of Zachary Short and compares the abbreviated life story told at Short's capital trial with the more robust mitigation picture–one that incorporates neuroimaging–that was presented on Short's behalf in state post-conviction relief proceedings.[35]

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32. *Id.* at 261-62. The Supreme Court has consistently defined mitigation in the broadest possible terms. In *Woodson v. North Carolina*, 428 U.S. 280 (1976), the Court explained that if our society chooses to impose the ultimate punishment, the Eighth Amendment requires that we do so by individualized determinations that permit consideration of "the possibility of compassionate or mitigating factors stemming from the diverse frailties of humankind." *Id.* at 304. The Court later reiterated that the Eighth and Fourteenth Amendments require that the sentencer "not be precluded from considering, as a mitigating factor, any aspect of a defendant's character or record and any of the circumstances of the offense that the defendant proffers as a basis for a sentence less than death." Lockett v. Ohio, 438 U.S. 586, 604 (1978) (emphasis omitted); *see also* Penry v. Lynaugh, 492 U.S. 302, 319 (1989); Skipper v. South Carolina, 476 U.S. 1, 6 (1986); Eddings v. Oklahoma, 455 U.S. 104, 113-14 (1982). More recently, the Court has stated, "[v]irtually no limits are placed on the relevant mitigating evidence a capital defendant may introduce concerning his own circumstances." Tennard v. Dretke, 542 U.S. 274, 285 (2004) (quoting Payne v. Tennessee, 501 U.S. 808, 822 (1991)).

33. Blume et al., *supra* note 27, at 1038; *see also* Michelle E. Barnett et al., *When Mitigaiton Makes a Difference: Effects of Psychological Mitigating Evidence on Sentencing Decisions in Capital Trials*, 22 BEHAV. SCI. & L. 751, 754, 762-65 (2004) (using ten different vignettes to demonstrate that factors such as severe abuse as a child and mental retardation mitigated the likelihood of a death sentence); Stephen P. Garvey, *The Emotional Economy of Capital Sentencing*, 75 N.Y.U. L. REV. 26 (2000). Garvey wrote in relevant part as follows:

> Telling a defendant's story does indeed appear to have its intended emotional effect. . . . If a juror believed that the defendant experienced the torment of abuse as a child, labored under the burden of a mental defect or mental retardation, was emotionally disturbed, battled with alcoholism . . ., was a loner in the world, or had generally gotten a raw deal in life, the usual response was sympathy or pity.

Garvey, *supra*, at 57 (footnotes omitted).

34. This hypothetical is based upon examples from our experiences in actual cases that they have litigated or are currently litigating. To protect the confidences of their clients, we have chosen to use a hypothetical example. All names, locations, and other details are fictional, and any similarities to actual cases should be regarded as coincidence. We do not suggest, however, that this example is pure fantasy. Indeed, we see examples just like this one regularly.

35. State post-conviction relief is a mechanism designed to address trial errors grounded in state or federal law that were not available for direct review. Thus, a post-

B. The Trial Story

In 2005 Zachary Short was tried for the murder of a police officer in a rural community in Aiken, South Carolina. Short was a thirty-two-year-old, white male with a tenth-grade education. During the guilt-or-innocence phase of his capital trial, the State offered evidence to establish that Short spent the day of the crime in the woods behind his home, drinking beers with friends and target shooting. Around 5:30 p.m., Short walked to the home of his estranged girlfriend, Shannon Morales, which was not far from his own home. Short still carried the pistol that he had used to shoot at beer cans earlier in the day. He pounded on the back door, asking Morales to come outside so that he could speak with her. Instead, she called the police, but by the time Officer Steve Simon arrived, Short was nowhere to be found. Officer Simon searched the woods behind Morales's house but found nothing. The area of town where both Short and Morales lived was notoriously known as the "white trash" part of town. Domestic disputes, public drunkenness, drug possession, theft, and other similar crimes were commonplace in that area. Officer Simon took down Morales's name and information, told her to call back if she had any more trouble, and drove away.

Approximately one hour after Morales first called the police, Short returned and recommenced banging on the back door of Morales's house. Morales called 911. Officer Simon responded to the call, telling dispatchers that he had already been to the scene earlier that day, and he was not far away when he received the call. By all accounts, it was dark by the time Officer Simon arrived, and he had not turned on his blue lights or siren. He parked in Morales's front yard, got out of the car carrying a flashlight and a portable radio, and circled around to the back door. Morales later recounted that she heard a noise like someone yelling "halt" or "stop," followed by three or four gunshots in rapid succession. She called 911 for a third time that day, this time to report a shooting. Additional officers responding to the call found Officer Simon lying a few feet from the back door, shot twice in the head. The police quickly organized a search of the wooded area behind Morales's

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conviction lawyer looks back at what occurred at trial and raises any "off the record" errors that may warrant post-conviction relief. A trial attorney's failure to investigate and present evidence of neurological damage (through the use of neuroimages or other evidence) is an example of a post-conviction claim. For a detailed discussion on post-conviction procedure, see generally John H. Blume & Emily C. Paavola, *A Reintroduction: Survival Skills for Post-Conviction Practice in South Carolina*, 4 CHARLESTON L. REV. 223 (2010).

house. Short was found a few hours later, lying on the ground in a heavily wooded area with the murder weapon beside him.

The State argued that Short knew Officer Simon had come out to the scene on the first occasion and that Short waited, watching from the woods, until Simon went away. The State asserted that from the vantage point of Morales's back door, Short must have seen Officer Simon's headlights coming down the road when he returned for the second time. Short knew that Officer Simon was on the way, so he waited, aimed carefully until he had a clear shot, and then ambushed the unsuspecting policeman. The defense's theory was that after drinking beer all day long, Short was extremely drunk and unaware of what he was doing. Short's attorneys suggested that the shooting was an accident, and Short had fired at Officer Simon because he was surprised by the officer's presence. The defense presented the testimony of an expert in psychopharmacology who told the jury that Short had a drug and alcohol problem. He estimated that Short's blood alcohol level was between 0.18 and 0.71 based on Short's self-report on the amount of alcohol he had consumed over the course of the day. The jury deliberated for forty-eight minutes before finding that Short was guilty of murder.

In the penalty phase, the State focused on showing the impact that Officer Simon's death had on his family members and friends. Officer Simon's widow, father, brother, extended family members, and former fellow officers all testified that he was a wonderful person and that his death had devastated them. They further testified that Officer Simon's death had negatively impacted the police force and the many community charities and civic organizations in which he was involved. The State also argued that Short was a "career criminal" who would continue to misbehave if sentenced to life in prison because he had committed several prior petty crimes, such as stealing from his workplace and breaking into cars.

The defense relied primarily on the testimony of a social worker who explained that Short grew up in a poor family. The social worker testified that Short lived with his mother and three siblings. His father spent most of his time in and out of jail. Short's mother had a boyfriend who was married with a family of his own. The boyfriend was an angry and volatile man. The social worker suspected that the boyfriend had been physically violent on some occasions, but she had no records or other documentary evidence to confirm those suspicions. Similarly, the social worker claimed that the boyfriend had tried to sexually abuse Short's sisters, but again, she had no evidence to corroborate that claim, and she could not say whether Short was aware of any alleged sexual abuse. Finally, the social worker told the jury that despite Short's

mother's poverty, lack of education, and other shortcomings, Short's mother did her best to raise her children well and provide for their basic needs.

Once again, the jury deliberations were short. This time it took only forty-six minutes for them to decide that Zachary Short should be sentenced to death. Afterwards, several of the jurors recounted how they had come to their decision:

> "There wasn't really much to talk about. It was clear that he did it. When it came time to decide the sentence, we all felt very bad for Officer Simon's wife and children. His death was senseless. There was no excuse for it."
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> "I didn't feel bad for Zachary Short. So what if he was drunk? That's no reason to kill somebody."
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> "All of the jurors cried when Officer Simon's widow talked about how his death had affected her and their children. He was a good man, and he did a lot of good things for the community. I felt so sorry for his family because they had to sit through the trial and hear all of that testimony about how he died. Zachary Short was poor and his daddy wasn't around? So what? Lots of people have a hard life, but they don't go out and kill somebody over it."
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> "I didn't hear anything from the defense to persuade me to have mercy on Zachary Short. As far as I am concerned, he is a cold-blooded killer. He deserves to die."

C. The Post-Conviction Story

In preparation for his post-conviction relief proceedings, Zachary Short's post-conviction attorneys began investigating his life history from scratch. The investigation showed that Short had a much more robust and compelling mitigation story worth telling–one that the jury at his trial had never heard.

Zachary Short was born to William and Sarah Short one year after his oldest sister, Molly. His two younger siblings, Alex and Teresa, followed shortly thereafter. William Short had only a seventh-grade education and worked as a sharecropper. He was also an alcoholic who was frequently arrested for driving under the influence, public drunkenness, welfare fraud, and petty theft. Both of Zachary's grandfathers, along with a long list of aunts, uncles, and cousins, also struggled with alcohol and drug addiction. The Short family lived in poverty. When William was not in jail, he was drinking, and the family never had enough money to pay the bills. While William was away in jail, Sarah Short began an affair with a married man named James Matthews, whose habits closely mirrored William's. Matthews had a wife and four children of his own.

After the affair began, Sarah and William officially separated. Zachary was approximately three years old. Sarah moved into a trailer next to the one Matthews shared with his wife and children. The families lived side-by-side for the rest of their lives, with Matthews acting as a dysfunctional father figure for both groups. They lived in a run-down section of town–an area filled with tiny shacks and dilapidated mobile homes surrounded by industrial factories and plants. Other people in town called it "the Boulevard," denoted by a long stretch of highway dividing the nice part of town from the disfavored area, which was filled with smokestacks and raw industrial stench. Even among their fellow residents of the Boulevard, the Shorts were the subject of constant gossip and ridicule because of their unconventional living arrangements. One neighbor recalled a name she used to describe them:

> I called them the circus family. They lived in like a compound–two trailers right next to each other. There was a constant stream of people in and out of both houses–eight children, three adults, tons of cousins and relatives. Everyone just came and went like they all lived there. People were always getting drunk, fighting, getting arrested. It was chaos. Their situation was embarrassing. Matthews was a mean, violent drunk. He would beat the children and the "wives." It was humiliating the way he treated all of them. Everyone said that he sexually molested those girls. I don't know. I never asked. Most people tried to avoid the whole family. They just attracted trouble.

Children with struggles at home often turn to other outlets–school, for example–for stability and self-confidence.[36] Zachary Short, however, found no comfort in his academic studies. Instead, he consistently struggled in school. After he failed the first and third grades, he was referred for psychological testing. He scored poorly. His intelligence quotient (IQ) was measured to be in the mid-seventies.[37] The psychologist reported that Short had difficulties with visual perception, memory, sequencing, and spatial abilities. She determined that Short functioned in the Educably Mentally Handicapped range and recommended that he be placed in a school resource program for special assistance with his classes. Despite this extra help, Short's grades remained very low. He was occasionally placed in, or socially promoted to, higher grades, never

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36. *See* JAMES GARBARINO, LOST BOYS: WHY OUR SONS TURN VIOLENT AND HOW WE CAN SAVE THEM 168 (Anchor Books 2000).

37. An IQ score of sixty-five to seventy-five is within the range of mild mental retardation. *See* AAIDD Ad Hoc Committee on Terminology and Classification, INTELLECTUAL DISABILITY: DEFINITION, CLASSIFICATION, AND SYSTEMS OF SUPPORTS 36 (11th ed. 2010); AMERICAN PSYCHIATRIC ASSOCIATION, DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS 41-42 (4th ed. text rev. 2000).

achieving the necessary standards for earned promotion. Eventually, he dropped out of school in the tenth grade. His parents never attended a parent-teacher conference. His mother routinely failed to pay his minimal book fees and complete other basic registration requirements. Many of Short's teachers seemed to overlook him entirely. Years later, most of them could not even remember him, even though they had all heard about the capital crime with which he was charged. Short's eighth and ninth grade resource teacher–the one assigned specifically to give him extra help–had only a vague memory of him:

> Zachary Short is the one who killed that cop? I remember him a little bit. He missed a lot of school. I am sort of surprised that he would do something like that. He didn't seem all that bad to me. He was what I would call "a good ole redneck." His family lived on the Boulevard. The people who live over there are the kind who watch NASCAR and drink beer all weekend long. I don't really remember how he did in school. He must not have been doing very well if he was in my resource class. I bet he just didn't try very hard.

Each of Short's three siblings had similar school difficulties and intellectual deficiencies. His brother, Alex, was tested and diagnosed with mental retardation in the fourth grade. Alex was Short's only sibling who completed all twelve grades in school, but Alex did not receive a diploma because he was unable to pass the exit-testing requirements. Short's oldest sister, Molly, tested in the borderline mentally retarded range on IQ tests, became pregnant in the tenth grade, and never returned to school after that. Short's youngest sister, Teresa, received special education services from the time she was in preschool. Teresa's teachers noted that she had poor personal hygiene–her clothes, face, and hair were often dirty–and she frequently requested food shortly after arriving at school. Her behavior at mealtimes was recorded as "extremely hungry." Like her oldest brother and sister, Teresa dropped out of school in the tenth grade. She was later treated for depression, psychosis, and suicidal thoughts.

Sarah Short, Short's mother, had only a sixth-grade education. Like her family members, Sarah also abused alcohol, although she kept her drinking much more private than her husband, her boyfriend, or many of her relatives. To make ends-meet for herself and her children, Sarah became involved in crime. She took the children to the mall in a neighboring city and taught them to steal clothes and other items from department stores. She took objects out of the donation bins behind the Salvation Army and later sold them at flea markets. She stole checks and encouraged her children to do the same. Once, when Sarah could no longer afford her car payments, she and her kids took her car out to the river and sank it. Short followed his mother's example. At her

suggestion, he began taking chickens and eggs from neighbors' yards. Then he moved on to stealing cigarettes and beer from convenience stores. Eventually, Short progressed to stealing larger items, such as machinery and appliances from local businesses and empty cars. He was first arrested for shoplifting at age thirteen. Three years later, he confessed to a series of break-ins at local shops. After that, Short was arrested several more times for similar crimes, as well as for driving under the influence, before he was charged with the murder of Officer Simon.

Short had several medical problems. At least three serious head injuries with loss of consciousness were listed in his hospital records–two from car accidents and one from when a car transmission fell onto his head while he was doing some mechanic work. His school records chronicled a long history of low weight and short stature. His teachers and doctors consistently recorded that Short was very small for his age. At school, it was noted that he tired easily, was frequently ill, was frequently inattentive, and had difficulty with impulse control.

Thus, Short's life history–compiled from school, medical, and legal records as well as interviews with his teachers, friends, employers, and extended family members–pointed to several overarching mitigation themes. This history, however, also specifically suggested neurological damage from more than one potential cause. First, the cognitive deficiencies noted in Zachary's school records, along with his history of head injury and other traumas, pointed to potential brain damage. Second, maternal ingestion of alcohol, abnormally small size or failure to thrive in childhood, and difficulties with impulse control are all signs of a specific form of brain damage caused by Fetal Alcohol Spectrum Disorder. Finally, the Boulevard area of town itself proposed yet another etiology. The multiple industrial businesses in and around the Boulevard, where Short lived his entire life, raised the possibility that Short was exposed to environmental toxins. Several avenues of inquiry were necessary to complete this portion of Short's social history, including: (a) questioning family and friends about the Short family's water sources, outdoor activities, and food habits; (b) collecting documents from state and local environmental agencies and from each of the individual factories in the Boulevard; (c) interviewing representatives from the local and state environmental offices for answers to questions raised by the documents; and (d) researching news accounts about environmental problems in the Boulevard.

These efforts revealed that the Boulevard was essentially a toxic waste dump. From the time he was five-years-old until the time of the crime, Short's family lived approximately 100 yards from an area that was later designated an Environmental Protection Agency (EPA) superfund site.

For over forty years, a variety of industrial businesses–including two paint manufacturers, a furniture company, a wastewater treatment facility, a paper mill, and a nuclear power plant–routinely dumped toxic wastes into the water supply and surrounding grounds where Short spent his formative years. The Short family relied on well water drawn from the same ground where toxic chemicals were routinely deposited. Despite efforts by some state and local authorities to regulate discharges near the Boulevard, the businesses routinely failed to do anything to improve the situation. Local authorities in particular tried to prevent the pollution by sending warning letters, conducting ground and water inspections, and even filing a series of lawsuits against offending businesses. Still, the pollution persisted. State politicians stepped in, putting pressure on local authorities to back off of businesses that brought important jobs and revenues to the state. Backed with support by more powerful, state-level figures, the businesses simply ignored local efforts to address their polluting. The state pollution-control authority wrote a letter concerning one particular offending factory, describing the situation as follows:

> The Print Works Factory discharge exists now much the same as it did before court proceedings were brought against it ten years ago. On inspection, we found a most disgusting situation, with extremely large amounts of excessively strong dye wastes and viscous pigments from their operation discharged directly into the feeding waters of the river. The firm has made no apparent attempt to alleviate the situation and certainly no progress has been made in the fight to upgrade the water quality with such discharges present. The apparent apathy of the firm concerning the problem is very evident in its lack of civic and environmental responsibility to the people and area directly affected by its pollution.

Short regularly swam, fished, and played in the same waterway described in that letter. An expert in marine biology reviewed nearly 7000 pages of documents related to the pollution problem on the Boulevard and concluded that Short had likely been exposed to lead, zinc, magnesium, heavy metal copper, and organic contaminants, all at levels known to be unsafe to humans due to their potential to cause cognitive and neurological impairments. This danger is especially true for children: they are uniquely susceptible to environmental exposure to toxic compounds because their bodies are developing more actively than those of adults. Children also tend to have greater exposure to environmental toxins due to their recreational activity patterns and greater hand-to-mouth behavior.

Based on the information developed from Short's social history, his post-conviction team decided to take steps to test for neurological

damage. First, a neuropsychologist evaluated Short and found that he scored below normal on a variety of tests designed to measure verbal reasoning, abstract reasoning, impulsive responses, and tactual memory–functions that are largely associated with the prefrontal and central cortex areas of the brain. The neuropsychologist also conducted a QEEG study that supported the neuropsychological test findings by pointing to various degrees of brain damage in these same areas of the brain.[38] Based on these results, Short's counsel then discussed the case with a psychiatrist and neurologist, who advised them that based on the information available from all sources, Short clearly had neurological dysfunction, and there was a significant likelihood that brain abnormalities would be evident from neuroimaging. The psychiatrist and neurologist recommended that an MRI and PET scan be conducted. Visual and quantitative analyses of the MRI and PET scan data revealed significant abnormalities in both the structure of Short's brain and the manner in which it functioned. The detected abnormalities were consistent with brain damage resulting from fetal alcohol exposure and environmental toxin exposure.

Short's trial attorneys were largely unaware of his life history. The social worker they hired conducted brief interviews with Short's two sisters and an aunt. The social worker also collected some, but not all, of his school and medical records. Aside from that, the defense team collected no other information about his background. Had Short's trial counsel collected the complete social history that was later uncovered after Short's conviction, the story about how he ended up shooting Officer Simon and the penalty phase plea for his life could have both been very different. Short was not just an average kid who may have had some hard lumps in life like everyone else. He was the product of a complex series of personal disadvantages. Before he was even born, his mother's choices contributed to brain damage that would affect him throughout his life–impairing his judgment, diminishing his ability to control his impulses, and damaging his adeptness at reasoning, decision making, and planning. His general poverty and chaotic home life compounded his problems and contributed to his family's inability to escape an environment in which Short was exposed to toxic chemicals, resulting in further damage to Short's brain. On the day that Officer Simon was killed, Short was operating with an abnormal brain and a lifetime of disadvantages. He was not just a drunk who decided to kill a cop out of spite. The images of Short's brain damage corroborate this story and visually depict the story's result, but the images are not the

38. A "QEEG" is a quantitative electroencephalogram.

story itself. In other words, there was a much more compelling story to be told on Short's behalf, and the results of the neuroimaging played an important part in completing that picture.

IV. RISKS ASSOCIATED WITH THE USE OF NEUROIMAGES IN CAPITAL CASES

Although neuroimaging can be a relevant and useful piece of mitigation evidence, the decision to go forward with brain imaging is not one to be taken lightly or made quickly. There are a number of potential risks to be considered when thinking about the use of neuroimaging in a capital case. This section discusses several risks that we have discovered in their own cases or witnessed in others.

A. Errors in Analysis

One potential risk of neuroimaging to consider is the risk of error in the analysis of neuroimages. Traditionally, neuroimages have been analyzed by a visual review of the films by a radiologist or neurologist. This method of analysis gives rise to problems of subjectivity, bias, and other human errors:

> Brain imaging is the product of a complex set of techniques, subjective decisions, technical choices, and informed interpretations. Scientists, technicians, and clinicians decide the level of detail they will use to scan the brain. They must determine what types of imaging should be ordered, how thick or thin the slices should be, the degree of clarity, the difference in contrast between types of tissue, and how the signal should be filtered from background noise.[39]

The case of Robert South illustrates this point. In 1983 South was convicted of murder and sentenced to death for the drive-by shooting of a police officer.[40] The facts of the crime were rather bizarre in that South had no prior history of violence.[41] South had apparently been driving down the highway in his pickup truck when he spotted an officer on the opposite side of the road making a traffic stop. South aimed a rifle out of his driver's side window and shot the officer once in the head.

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39. Joseph H. Baskin et al., *Is a Picture Worth a Thousand Words? Neuroimaging in the Courtroom*, 33 AM. J.L. & MED. 239, 249 (2007).

40. State v. South, 427 S.E.2d 666, 668 (S.C. 1993).

41. John Blume served as counsel for Robert South in his federal habeas corpus proceedings and at his motion for new trial on the ground of after-discovered evidence. Facts in this section without citations are taken from Blume's personal knowledge of the case.

South was arrested less than a minute later.[42] Friends and family could offer no explanation for South's actions.

Prior to South's trial in 1983, a CT scan of his brain was conducted. The radiologist who reviewed the film read the scan as normal. Six years later, an MRI revealed a brain tumor that the radiologist had previously failed to discover. There was no dispute that the tumor existed in 1983. In fact, the tumor was clearly visible on the previously produced CT scan. The tumor was approximately the size of a walnut. It was located on the pineal gland of the brain and had not grown substantially in size, if at all, since the time of South's trial.[43]

Little was known about South's particular type of tumor at the time, but it was of the same type and located in the same area of the brain as those at issue in several other cases with similarly bizarre facts. For example, on August 1, 1966, Charles Whitman, a twenty-four-year-old former Marine and University of Texas student, murdered his wife and mother.[44] Then he purchased ammunition and a shotgun and climbed the bell tower at the University of Texas, killing two more people along the way.[45] From the tower he opened fire, killing eleven more people below before he was shot by police officers.[46] Prior to the killings, Whitman wrote a note: "Lately, (I can't recall when it started) I have been the victim of many unusual and irrational thoughts."[47] Whitman's autopsy revealed a tumor that impacted the same area of the brain where South's tumor was located.[48] The role that Whitman's tumor may have played in his actions was later debated.[49] Because Whitman died before he could be tried for his crimes, a jury was never given the opportunity to decide the tumor's significance.

In Robert South's case, the radiologist who had previously read the CT scan as normal was confronted with the former scan and the newly obtained MRI film. The radiologist acknowledged that he had made an egregious error, saying, "Oh my god, how could I have missed it?" The General Sessions Court of Lexington County, South Carolina, granted South a new sentencing proceeding after determining that the evidence of his brain tumor would probably have changed the outcome of the penalty phase.[50] Although the kind of gross error that occurred in

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42. *South*, 427 S.E.2d at 668.
43. *Id.*
44. Baskin et al., *supra* note 39, at 261.
45. *Id.*
46. *Id.*
47. *Id.*
48. *Id.*
49. *Id.*
50. *South*, 427 S.E.2d at 670.

South's case is still a risk today, often the risk of error is even greater than in South's case because the relevant evidentiary findings are likely to be more subtle and more open to subjectivity than a clearly visible tumor that is the size of a walnut. In smaller markets, this problem is often compounded by the absence of a specialist in neurology who can interpret the scans. Instead, a general radiologist will typically be the one to read the scans. Even when a specialist is available, often times the specialist's training is not specific to the kind of inquiry relevant to capital cases. And as discussed above, even with the best equipment available and specialists trained specifically to look for more subtle findings, subjectivity is still always an issue, which increases the potential for error. The methods of quantitative analysis described in Part II.D. remove some of the subjectivity factors and are therefore more likely to be reliable.

B. Overreliance on Imaging

Another major risk of neuroimaging to consider is the negative impact of overreliance on imaging. Many types of brain dysfunction are not detectible through neuroimaging. A "normal" brain scan can negate other clinically sound evidence of brain dysfunction detected through sophisticated neuropsychological testing. However, jurors and judges–like laypersons–may not necessarily understand this fact. Jurors are more likely to dismiss even clinically sound evidence of brain dysfunction if the "picture" of the brain does not "reveal" the impairment.[51] Likewise, judges are more likely to make erroneous evidentiary and funding decisions if they are operating under the misperception that no brain damage exists because the neuroimage is "normal."

For example, at the 2002 capital trial of Kevin Mercer, the defense team attempted to call Dr. John Steedman, a neurologist and psychiatrist, to testify that a SPECT scan of Mercer's brain showed a significant abnormality.[52] Mercer was charged with an armed robbery and shooting that occurred while he and a codefendant were carjacking their victim.[53] Dr. Steedman was prepared to testify that the scan showed reduced blood flow and activity in the left orbitofrontal cortex of the brain, an area that "a lot of experts in the field of functional brain imaging" have identified as being "associated with memory problems,

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51. *See* John H. Blume, *Mental Health Issues in Criminal Cases: The Elements of a Competent and Reliable Mental Health Examination*, ADVOCATE, Aug. 1995, at 9, *available at* http://apps.dpa.ky.gov/library/advocate/pdf/1995/adv081995.pdf.

52. Transcript of Record at 2263, 2274, State v. Mercer, 672 S.E.2d 556 (S.C. 2009) (No. 26582).

53. *See Mercer*, 672 S.E.2d at 558-59.

emotional problems, and judgment and planning problems."[54] The State objected to Dr. Steedman's proposed testimony, claiming unfair surprise based on the radiologist's report that the defense had previously disclosed.[55] The radiology report stated that the purpose of the SPECT scan was to look for "dementia," and as to this inquiry, the radiologist determined that the scan showed a "questionable abnormality."[56] The radiologist opined, "I do not believe this is an adequate etiology for dementia or other severe abnormality."[57] The State argued that the report said nothing was wrong with Mercer's brain, but the defense expert planned to testify to the opposite conclusion.[58] The court sided with the State, saying,

> When I read that report, that report is normal. And this expert–and so the state reading that says, reasonably, no need to do anything. Then he comes in and gives a different opinion and now–
>
> . . . .
>
> I mean, I know it says, "questionable abnormality." I can read it. But that–that–questionable abnormality is not something that jumps right out as this opinion does. Definite abnormality is what he's saying.[59]

The court also asserted that because it viewed the radiologist's report as in conflict with Dr. Steedman's testimony, Dr. Steedman's opinion may not even be admissible from an evidentiary perspective: "from a legal standpoint, questionable calls into question, first of all, its admissibility."[60] Ultimately, the court ruled that Dr. Steedman could testify, but he could not give his opinion that the SPECT scan showed any abnormality.[61] Since the abnormality was the main point of Dr.Steedman's testimony, he no longer had much to say. During the State's questioning of Dr. Steedman, the State took the opportunity to repeatedly suggest that there was nothing wrong with Mercer's brain:

> Q: A SPECT scan measures blood flow. Is that your testimony?
> A: Yes.
> Q: Blood flow in the brain? The report that you have from the radiologist . . . .
>
> . . . .

54. Transcript of Record, *supra* note 52, at 2281-82.
55. *Id.* at 2279-80.
56. *Id.* at 2277.
57. *Id.* at 2274.
58. *Id.* at 2282.
59. *Id.* at 2285-86.
60. *Id.* at 2286.
61. *Id.*

> . . . He–when he took a look at this, his impression was a questionable abnormality. Correct?
> A: Yes.
> . . . .
> Q: And he says that, "I do not believe that it is an adequate etiology for dementia nor other severe abnormality." Isn't that correct?
> A: That's what it says.
> . . . .
> Q: And you are not here to testify to this jury that a questionable abnormality whose significance is questionable was the cause for Kevin Mercer committing a carjacking in May of 2002, are you?
> A: No, not as a proximate cause. No.
> Q: And you are not here to say that a questionable abnormality whose significance is questionable was the cause of Kevin Mercer putting a gun and shooting [the victim] in the back of the head in May of 2002 either, are you?
> . . . .
> A: I think what I would say what I am here to do–
> Q: Before you answer, if you could just say yes or no.
> A: Yes.
> Q: You are saying that the–that was the cause that that–
> A: Depends on what you mean by the cause, sir. Do you–
> Q: That he did this because of a questionable abnormality who the radiologist said significance is questionable . . . . That is not what you're here for, is it?
> A: I would say in my opinion, my expert opinion that I'm here for, is that if you have an abnormality of the brain, this can be a contributory factor to having poor judgement.
> Q: A contributing factor to poor judgment.
> A: Uh-huh.
> Q: If you have an abnormality of the brain; right?
> A: Uh-huh.
> Q: But what we have here in this report is a questionable abnormality; correct?
> A: That's what's reported.[62]

Dr. Steedman was the last defense expert to testify in the penalty phase. Kevin Mercer was sentenced to death a few hours later.[63]

Although this Article focuses on examples and advice distilled from our own cases, an informal survey of reported decisions in other capital cases suggests that the error of overreliance on imaging affects the outcome in many cases. We have collected and reviewed approximately

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62. *Id.* at 2307-10.

63. Emily Paavola currently represents Kevin Mercer in his state post-conviction relief proceedings.

seventy-five opinions discussing the use of neuroimaging in capital cases in various procedural contexts. The cases generally fall within four procedural categories: (1) post-conviction cases in which trial counsel are alleged to have been ineffective for failing to obtain or utilize neuroimages at trial;[64] (2) posttrial claims of newly discovered evidence;[65] (3) funding requests;[66] and (4) direct appeal opinions discussing the use or admissibility of neuroimages at trial.[67] We looked most closely at the first three categories of claims. All three categories involve claims requiring some showing of prejudice or materiality.[68] The overwhelming majority of these decisions discuss unsuccessful claims asserted on behalf of capital defendants. The most common reason that the claims were denied was that some other preexisting evidence, usually structural imaging of the brain, suggested that no brain damage was present.[69]

V. CONCLUSION–LESSONS FROM THE FRONT

The question of whether the defense team should utilize neuroimaging in preparation for the penalty phase of a capital trial does not have a

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64. *See, e.g.*, Head v. Carr, 544 S.E.2d 409 (S. Ct. Ga. 2001); Bryan v. Mullin, 335 F.3d 1207 (10th Cir. 2003); Lawrence v. State, 969 So. 2d 294 (S. Ct. Fla. 2007).

65. *See, e.g.*, Smith v. Anderson, 402 F.3d 718 (6th Cir. 2005); Taylor v. State, 3 So. 3d 986 (S. Ct. Fla. 2009).

66. *See, e.g.*, Clayton v. Roper, 515 F.3d 784 (8th Cir. 2008); Sexton v. State, 997 So. 2d 1073 (S. Ct. Fla. 2008).

67. *See, e.g.*, Philmore v. McNeil, 575 F.3d 1251 (11th Cir. 2009); Brant v. State, 21 So. 3d 1276 (S. Ct. Fla. 2009).

68. In order to establish ineffective assistance of counsel, for example, the claimant must first prove deficient performance (that his trial counsel's performance was unreasonable) and prejudice (that but for his trial counsel's error, there is a reasonable probability that the outcome of the trial would have been different). Strickland v. Washington, 466 U.S. 668, 687 (1984). To win a new trial based on evidence discovered posttrial, the claimant generally has to show that the new evidence "(1) would probably change the result if a new trial is had; (2) has been discovered since the trial; (3) could not have been discovered before trial; [and] (4) is material to the issue of guilt or innocence," or in a capital case, to the penalty phase of the trial. *South*, 427 S.E.2d at 668-70. To prove that a trial court erred in denying a request for funding, the claimant must show that he or she had a particularized need for the funding and that the denial of funding resulted in prejudice. *See* Ake v. Oklahoma, 470 U.S. 68, 82-83 (1985).

69. *See, e.g.,* Davis v. State, 742 So. 2d 233, 237 (Fla. 1999) (concluding that newly discovered evidence of a PET scan showing that the defendant had a seizure disorder would not have affected the outcome of his trial because a CT scan and EEG taken before trial had both been normal); Bates v. State, 750 So. 2d 6, 15-17 (Fla. 1999) (holding that denial of funds for expert services for a neuroradiologist, a behavioral neurologist, and a SPECT scan did not violate defendant's right to a mental health evaluation under *Ake* and that defendant could not show a particularized need nor prejudice because a pretrial MRI did not show any brain damage).

one-size-fits-all answer. If the theme of the mitigation case–at trial or in post-conviction–involves brain damage or neurological impairment, neuroimaging can be very effective. However, as we have explained, there are some major risks to consider. There is no easy solution, but the following steps must be taken before any imaging studies are even considered.

First, the defense team must conduct a comprehensive, multigenerational investigation of the defendant's social history. This investigation is the foundation of any competent and reliable mental health evaluation in a criminal case. Neuroimaging is neither a substitute for a comprehensive social history investigation nor a shortcut that can be used to streamline an investigation. In short, in the capital defense setting, neuroimaging is not an investigative tool at all. In the right cases, it is a tool used to *confirm* the presence of brain dysfunction, not to *investigate* whether the client in fact has brain damage. Thus, neuroimaging should never be considered until the social history investigation is completed.

Second, in most cases, neuropsychological testing should be conducted, especially if there have been no previous neuropsychological assessments. A neuropsychological test battery is the most reliable method of assessing whether the client has brain dysfunction. The tests will help assess whether neuroimaging should be considered, but the tests will rarely be determinative of the wisdom of pursuing brain imaging.

Third, depending on the results of the social history investigation and neuropsychological testing, the client should be examined by a neurologist or a neuropsychiatrist. This should include a physical examination. Depending on the results of the neurological or neuropsychiatric examination, considered in light of the social history and neuropsychological examination, the attorney is ready to discuss the wisdom of neuroimaging with his or her expert. In the majority of cases, the expert will advise against neuroimaging. Many types of brain abnormalities will not be testable by the neuroimaging techniques and analysis methods available to indigent defendants. Thus, in a significant number of cases, having an MRI or PET conducted can only generate evidence that will be misused by the prosecution (as Kevin Mercer's case illustrates) in an attempt to persuade the fact-finder that the defendant's brain is normal.

Finally, if neuroimaging has previously been conducted and the film was read as "normal," the attorney should have the films and underlying data examined by your own expert. Given the variables of inadequate training, incompetence, and human error, it is possible (as Robert South's case illustrates) that the previous examination confirms, rather than negates, brain dysfunction.