

MOLLY J. HUSKEY
State Appellate Public Defender
State of Idaho
I.S.B. # 4843

MARK J. ACKLEY, I.S.B. # 6330
PAULA M. SWENSEN, I.S.B. # 6722
Deputy State Appellate Public Defenders
3647 Lake Harbor Lane
Boise, Idaho 83703
(208) 334-2712

**IN THE DISTRICT COURT OF THE FOURTH JUDICIAL DISTRICT
OF THE STATE OF IDAHO, IN AND FOR THE COUNTY OF ADA**

ERICK VIRGIL HALL,)	
)	CASE NO. SPOT0500155
Petitioner,)	
)	FOURTH AFFIDAVIT OF
v.)	DR. JAMES MERIKANGAS, M.D.
)	
STATE OF IDAHO,)	
)	
Respondent.)	(CAPITAL CASE)
_____)	

State of Idaho)
) ss.
County of Ada)

I, James Merikangas, M.D., being competent to testify state under penalty of perjury that the following is true and correct to the best of my experience and knowledge:

BACKGROUND

1. I have been retained by the Idaho State Appellate Public Defenders Office (SAPD) as an expert in neurology and psychiatry to review certain matters in the case of Erick V. Hall v. State of Idaho, Ada County case no. SPOT0500155, to review appropriate records and

transcripts, to perform neurological and psychiatric examinations, to recommend appropriate neurological testing, and to review and interpret the results of such testing.

2. My education, employment and experience are set forth in my Curriculum Vitae, which I understand has already been filed with the Court.

PURPOSE OF AFFIDAVIT

3. My previous affidavits have set forth the materials and records I have reviewed, the examinations I've performed on Mr. Hall, the neurological testing which has been conducted on Mr. Hall at my recommendation, and my findings based on all of those materials.
4. I was recently provided the State's Response to the Final Amended Petition, along with the Affidavit of Dr. Helen Mayberg, for my review and comment. This affidavit specifically responds to Dr. Mayberg's assertions regarding the neuroimaging scans conducted at my request on Mr. Hall, and my clinical findings.

RESPONSES TO STATE AND DR. MAYBERG'S ASSERTIONS

5. In 1981, I published "THE NEUROLOGY OF VIOLENCE" in *Brain Behavior Relationships, JR Merikangas Ed. Lexington: Heath 155-185*, in which I outlined the approach to the diagnosis and treatment of violent behavior. My procedure for diagnosis comports to the standard of care for forensic evaluations. In 2007 the Federal District Court in for the Northern District of West Virginia ruled in a Daubert hearing that my clinical method, including the use of MRI and PET scans, met the federal standard for scientific evidence. *See Burgess-Lester v. Ford Motor Co., 2007 WL 2463264 (N.D.W.V. 2007)*. I have presented neuroimaging evidence in numerous state and federal

jurisdictions, and have testified for the Court, the Prosecution, and the Defense in civil and criminal matters as an expert witness.

6. The State's response to Final Amended Petition for Post Conviction Relief makes a number of inaccurate claims about the utility of PET scans and MRI scans and the significance of these tests in the diagnosis of brain disorders. The State relies upon the Affidavit of Dr. Helen Mayberg, in which Dr. Mayberg also makes a number of inaccurate or misleading statements about the utility of neuroimaging, about the significance of the results of the neuroimaging which I ordered conducted on Mr. Hall, and about my findings described in previously submitted affidavits.
7. Dr. Mayberg claims to be an expert "in the appropriate uses and limitations of positron emission tomography (PET) and magnetic resonance imaging (MRI) in the diagnosis and assessment of neurological and psychiatric disorders". (Affidavit of Helen Mayberg, M.D., p.1.) In fact, she is not a psychiatrist, not a radiologist, and is not certified in nuclear medicine. Her career has been in research, not in the evaluation and treatment of psychiatric patients with behavioral disturbances.
8. Dr. Mayberg asserts in her affidavit that "The use of PET for the clinical diagnosis and treatment of individual patients is extremely limited..." and would have this Court believe that the use of PET scans for clinical diagnosis and treatment is limited to lesion lateralization for surgery on patients with EEG-proven temporal lobe epilepsy, grading brain tumors and differentiating radiation necrosis and recurrence of brain tumors, and in the differential diagnosis of certain dementias. (Affidavit of Helen Mayberg, M.D., p.5) This assertion is belied by Dr. Mayberg's own publications, as described below.

9. According to Robin Hurley, et al In ‘RATIONAL APPROACH TO BRAIN IMAGING AND ELECTROPHYSIOLOGY.’ In: C. Edward Coffey, et al eds. *Guide to Neuropsychiatric Therapeutics. 1st Ed: Lippincott Williams and Wilkins; 2007*, “PET is used in the evaluation of many neurological conditions, particularly epilepsy (seizure focus localization), central nervous system malignancies (both detection and grading), head trauma (lesion detection) and cerebrovascular disease (evaluation transient ischemia and cerebral vascular reserve).”
10. Dr. Mayberg has used functional brain imaging to make the claim that she can diagnose affective disorders (mania and depression) with MRI and PET. In: “MANIA AFTER BRAIN INJURY: NEURORADIOLOGICAL AND METABOLIC FINDINGS” *Ann Neurol 1990;27:652-659*, which she co-authored, the following abstract appears: “We present a consecutive series of 8 patients who developed a manic episode after a brain injury. Five patients had cortical lesions (4 with damage to the right basotemporal region, and 1 with bilateral damage to the orbitofrontal area). While the other 3 patients had subcortical lesions (white matter of the right frontal lobe, right anterior limb of the internal capsule, and the right head of the caudate), a ¹⁸fluorodeoxyglucose positron emission tomography scan (PET) showed hypometabolism in the right lateral basotemporal region in all 3 patients. These findings suggest a major role for the basal region of the right temporal lobe in the modulation of mood.” It is therefore disingenuous, at best, for her to now assert that PET scans have such limited value as stated in her affidavit. It is particularly disingenuous given that Mr. Hall has hypometabolism in the temporal lobe.

11. Dr. Mayberg at times cautions against drawing cause and effect relationships between abnormalities found in brain imaging and patients' clinical histories or behaviors. For example, in her affidavit, Dr. Mayberg cites an article which she co-authored, "ETHICAL CLINICAL PRACTICE OF FUNCTIONAL BRAIN IMAGING" in *The Journal of Nuclear Medicine, Vol. 37 No. 7 July 1996*, in which criteria are given for reports of brain imaging. These included the warning phrase to be used as a disclaimer: "Although abnormalities are present in this study, there are no established cause and effect relationships between these observed abnormalities and the patient's clinical history or behavior in question." However, Dr. Mayberg herself ignores this advice in: "RELATIONSHIP BETWEEN REGIONAL BRAIN METABOLISM, ILLNESS SEVERITY AND AGE IN DEPRESSED SUBJECTS" *Psychiatry Research: Neuroimaging 155 (2007) 203-210*, where she used PET scans to assert that, "Non-response to treatment and previous depressive episodes were associated with a higher degree of age-dependent hypometabolism in the rostral and anterior cingulate cortex. The age-dependent changes documented herein may influence the distinct clinical presentation and treatment response described in older-age depression." Thus, Dr. Mayberg's assertion in her affidavit as to the extremely limited utility of PET scans is not supported by her own publications, where she herself draws cause and effect relationships between brain abnormalities and specific psychological problems.
12. Contrary to the assertions contained in her affidavit, Dr. Mayberg is well aware of the importance of neuroimaging in a forensic setting. In "THE ROLE OF NEUROIMAGING IN UNITED STATES COUTROOMS" *Neuroim Clin N Am 17 (2007) 557-567*, Dr. Mayberg concluded: "In sum, neuroimaging evidence has become

an increasingly important tool of proof in criminal and civil case in the United States. Although subject to the constraints of reliability and relevance, **results of neuroimaging scans can and do help courts to understand the nature, causes, and behavioral implications of injuries to the brain.**” (Emphasis added). Certainly Mr. Hall should be permitted to use the brain damage which shows on his neuroimaging scans to assist this Court in understanding “the nature, causes, and behavioral implications of injuries to the brain.” Moreover, that information should have been used to inform Mr. Hall’s *sentencing jury* understand the “nature, causes, and behavioral implications” of his brain damage.

13. Dr. Mayberg further states “PET is not a generally recognized test for diagnosing residual effects of past traumatic brain injury.” (Affidavit of Helen Mayberg, M.D., p.5.) But her opinion is simply an idiosyncratic opinion at variance with established peer-reviewed literature. For instance, the article “RECENT NEUROIMAGING TECHNIQUES IN MILD TRAUMATIC BRAIN INJURY,” Heather G. Belanger, et al, *J Neuropsychiatry Clin Neurosci* 19:1, Winter 2007, presents evidence that PET scans and other imaging procedures, “...can detect changes not demonstrated on conventional MRI or CT structural scans. Importantly these abnormalities are generally correlated with clinical outcomes.....”
14. The above article further emphasizes that, “...it is important to keep in mind that neuroimaging, like other medical tests and procedures, is typically interpreted in the context of the clinical history and other findings.” I have examined Mr. Hall and reviewed his medical records, and social and family history. To my knowledge, Dr.

Mayberg has not examined Mr. Hall, has not reviewed his social history or family records, and is therefore in no position to ethically comment on his case.

15. Dr. Mayberg claims that, “Conclusions suggesting a causal link between the PET findings and aggressive impulsive behavior, poor executive functioning, poor judgment and low intelligence are without scientific basis....” (Affidavit of Helen Mayberg, M.D., p.6.) This is misleading in two ways. First, I did not link causally link PET scan findings and specific behaviors. Second, there are established correlations between certain *areas* of the brain and aggressive behaviors. For example, the article “NEUROIMAGING STUDIES OF AGGRESSIVE AND VIOLENT BEHAVIOR” by Jana L. Rufkin and Vickie R. Luttrell in *Trauma, Violence, & Abuse, Vol.6, No.2, April 2005 176-191*, reviewed 17 neuroimaging studies using PET and other studies concluded that these studies, “reveal that the areas associated with aggressive and/or violent behavioral histories, particularly impulsive acts, are located in the prefrontal cortex and the medial temporal regions.” This certainly suggests that damage to a particular area of the brain may implicate the behaviors associated with it.
16. To the extent Dr. Mayberg implies that PET and MRI scans are not contributory to the understanding of the biological basis of violent behavior, she has ignored the peer-reviewed literature on the subject, including, “AN ANALYSIS OF REGIONAL CEREBRAL BLOOD FLOW IN IMPULSIVE MURDERERS USING SINGLE PHOTON EMISSION COMPUTED TOMOGRAPHY” by *Daniel G. Amen ,et al, J Neuropsychiatry Clin Neurosci 19:304-309, August 2007*, where it was demonstrated by PET scans, with appropriate statistics and controls, that “Murderers were found to have significantly lower relative rCBF (regional cerebral blood flow) during concentration,

particularly in areas associated with concentration and impulse control.” *See also*, “REDUCED PREFRONTAL AND INCREASED SUBCORTICAL BRAIN FUNCTIONING ASSESSED USING POSITRON EMISSION TOMOGRAPHY(PET) IN PREDATORY AND AFFECTIVE MURDERERS,” by *Adrian Raine, et al, Behav Sci Law* 1998; 16:319-332.

17. The federal government relies on PET scans in determining benefit eligibility. Medicare approves the use of PET scans in the evaluation of cognitive decline. This is certainly an admission by the Federal government of their utility.
18. Many courts, both civil and criminal, have admitted PET scan evidence, and it has been held to be reversible error to not admit this evidence. *See Hoskins v. State*, 702, So.2d 202, 210-11 (Fla. 1997)(holding denial of motions for PET scan were error, remanding case with instructions for trial court to order PET scan, and instructing trial court to hold evidentiary hearing to determine whether PET scan showed abnormality and whether neurological abnormality would have changed testimony neuropsychiatrist); *Hoskins v. State*, 735 So.2d 1281 (Fla. 1999)(vacating death sentence and remanding for new sentencing, after the trial court ordered PET scan which showed brain abnormality); *People v. Jones*, 210 A.D.2d 904 (N.Y. App. Div. 1994)(reversing judgment and granting new trial where trial court abused its discretion in denying defendant’s application for authorization to have neurological testing conducted based on reports that, as a child, defendant sustained a traumatic head injury that caused permanent brain damage).
19. Dr. Mayberg criticizes the attending radiologists for not offering a differential diagnosis, and claims that the findings are not diagnostic of specific disorders or syndromes. (Affidavit of Helen Mayberg, M.D., p.6.) The attending radiologists, Dr. Davey and Dr.

Garabedian, independently reviewed the scans and reported observations of the findings. However, differential diagnoses of clinical X-rays and scans seldom are offered by the radiologists, and it is not the job of a non-neurologist radiologist to do more than present the images and describe them. The diagnosis is the responsibility the clinician actually examining the patient, not just the neuroimages.

20. Furthermore, Dr. Mayberg admits she did not review the MRI images, but still criticized the attending radiologists for failing to observe or describe the thinning of the corpus callosum reported by me in my previous affidavit. That finding is not in the knowledge base of the average radiologist as being related to Fetal Alcohol Spectrum Disorder, and Dr. Mayberg cannot ethically comment on a scan she has not reviewed.
21. Dr. Mayberg attempts to discredit the reliability of PET scan results by contending that “in order for PET or any medical procedure to provide a scientifically reliable means to diagnose a specific medical condition, scan abnormalities must first be identified and statistically confirmed in groups of patients with that condition verified using independent clinical and pathological criteria.” (Affidavit of Helen Mayberg, M.D., p.5.) Dr. Mayberg extends this reasoning and asserts that abnormalities shown by the PET scans “cannot be confirmed in the absence of normative data from healthy controls of comparable age and gender to Mr. Hall scanned under comparable conditions on the same scanner,” and because those controls were not done concludes diagnosis is not possible because “no quantitative comparisons we performed to determine if Mr. Hall’s scan is in fact statistically and significantly different from the normal variations in scans of healthy subjects.” (Affidavit of Helen Mayberg, M.D., p.6.) However, this is a straw man argument. First, Dr. Mayberg herself does not always follow an “age-gender match

control protocol,” for example, those procedures were not followed in her article on “MANIA AFTER BRAIN INJURY,” *supra*. In fact, clinical radiological reports never present such data in the routine reading of images in medical practice. Radiologists and neurologists in practice and according to the standard of care required of their specialty, rely on their experience and knowledge to interpret images. A simple analogy is this: to diagnose a broken leg or pneumonia does not require a statistical sample of normal legs or lungs for diagnosis. That would be absurd, and the range of “normal variation” would be without useful meaning in diagnosing the broken leg or pneumonia.

22. Dr. Mayberg’s concluding paragraph stating that “there is no scientific basis to conclude that the MRI or PET scans provide objective evidence of a biologically based brain disease *responsible* for the defendant’s behavior as an infant, child, adolescent or adult or specifically, at the time of the crimes for which he was been accused,” is misleading and (Affidavit of Helen Mayberg, M.D., p.7), is likewise misleading and yet another example of a straw man argument. Dr. Mayberg’s statement “any conclusions based on these scan findings that the defendant suffers from a brain based defect of mind and reason that renders him substantially incapable of (1) conforming his conduct to the law or (2) appreciating the wrongfulness of his conduct are also scientifically unsupportable” is deceptive and constitutes a fundamental misstatement of my findings and conclusions. I never made the assertion that Mr. Hall met the conventional standard for insanity. Mr. Hall’s brain scans provide “objective evidence of a biologically based brain disease” but I never asserted that these are responsible for his behavior. There are no anatomical features that provide a simple explanation for complex human behavior. Dr. Mayberg has done nothing more than set up another straw man argument to require this in the

manner that a broken leg explains a limp. Life is just too complicated for that type of absurd analogy.

DATED this _____ day of March, 2008.

SUBSCRIBED AND SWORN to before me this ____ day of March, 2008.

Notary Public for Maryland
Residing at _____
My commission expires _____