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NEUROPSYCHIATRIC EVALUATION of ALKIVIADES “ALKI” DAVID INTERIM REPORT

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Alkiviades “Alki” David is a 55 year old white male referred by his sister for evaluation and management of long-standing disturbed behavior.

HISTORY

Mr. David was interviewed for a total of 3.5 hours over the course of three separate sessions. The first session began with AD relating that he wasn't sure why he needed to see a psychiatrist. He related details of his developmental and relationship history, beginning with his birth in Lagos Nigeria. Though tangential, he was redirectable enough to provide details about his three previous marriages and his current long-term relationship. However, after approximately 20 minutes he digressed onto a dissertation on certain of biblical characters that I found nearly impossible to follow. My probing led to him getting angry and frustrated. When I changed topics he launched into a discursive rant, laden with invective, where he described in detail his beliefs that a world-wide criminal organization composed of lawyers and judges were persecuting him. He was 100% convinced that this was true and was somehow the result of his championing the less fortunate or wealthy. For the next hour plus I was unable to obtain any other credible historical information, though I did obtain considerable evidence for his behavioral dysregulation and lack of insight. Subsequent sessions were kept much shorter, but still, his attention span rarely exceeded 10-15 minutes. The length of productive attention and engagement was strongly linked to the emotional valence of what he was talking about.

MENTAL STATUS EXAM

The patient's mental status was grossly the same overall at each session, which was as follows: His overall appearance exhibited good grooming and appropriate eye contact. His gait and station were normal. He appeared fit and in no apparent distress. He became psychomotor activated numerous times throughout the interview, but always within the context of the content he was reporting. Similarly, his affect was labile and energized, but congruent with his expressed mood at that moment. He expressed substantial anger throughout our sessions that was almost exclusively directed at his perceived persecutors. He also exhibited significant irritability at times of perceived slights or when I said that I was having difficulty following his train of thought. Mr. David's thought process was frequently nonlinear (tangential and circumstantial), perseverative and prone to lapses in logic. The content of these thoughts were notable for crystallized paranoia. In short, all trains of conversations return to an exposition about his persecution at the hands of a

vast, international legal cabal, comprising advocates, prosecutors and jurists. He further expresses a beliefs that this corrupt group is victimizing many others besides himself and is 100% certain that this is true. His assessment of evidence show a strong, if not pathological, confirmation bias and a concomitant bias against disconfirmatory evidence. The presence of these cognitive biases characterize psychotic patients and are often responsible for driving the steady worsening of delusional thinking [REF]. Mr. David's repeatedly evinces poor judgement and demonstrates limited insight. He denies the possibility that his thinking could be distorted. Similarly, he views his past behaviors as justified and reasonable, almost righteous, despite substantial evidence to the contrary. With regard to cognitions, he was alert and oriented in all spheres with no gross language deficits noted.

BRAIN IMAGING

MRI of the Brain Without Contrast. The patient was imaged using a 3 Tesla Siemens Verio MRI Open system, the following sequences were obtained: Localizer, T1-weighted 3D MPRAGE, T2 TSE axial, 3D double inversion recovery, T2 FLAIR sagittal, axial, and coronal, DWI axial, SWI axial. This study was notable for (1) Significant left frontal encephalomalacia, most prominently in superior frontal gyrus with gliosis in the deep white matter involving the paramedian frontal lobe, and (2) frontal volume loss, greater on the right than on the left.



Figure 1. Axial FLAIR image at level of superior frontal gyrus showing location of brain damage

Advanced MRI of the Brain And MRI Connectomics. The patient was imaged using a 3 Tesla Siemens Verio MRI Open system, a functional MRI study was performed using the following sequences: (1)3D MPRAGE, (2) Arterial Spin Labeling, (3) DWI/DTI Tractography and Fractional Anisotropy, (4) MRI Connectomics.

The arterial spin labeling study reveals markedly diminished perfusion in the left frontotemporal region. There is also diminished perfusion in the left parietal occipital area. This is consistent with less metabolism in these areas. This is a finding sometimes seen in depression the left frontal lobe. The patient has a lesion of encephalomalacia in the paramedian left frontal lobe. This will be further evaluated on a definitive SRI of the brain. DWI/fractional anisotropic study reveals marked asymmetry in the fractional anisotropy in the left frontal lobe. These findings are consistent with the

previously noted injury to the brain with encephalomalacia in this region.

Neuroquant Volumetric Analysis. The patient was imaged using a 3 Tesla Siemens Verio MRI Open system, a functional MRI study was performed using 3D MPRAGE and volumetric

analysis. This study revealed considerable bilateral volume loss in the temporal lobes two standard deviations below normal. This finding is also seen in the lateral occipital lobes. There is significant volume loss in the right superior frontal lobe 7th percentile as well as in the cortical gray matter, right worse than left.

PSYCHODIAGNOSTIC TESTING

Symptom Checklist-90 (SCL-90) The SCL-90 was administered to screen for overall psychopathology since he struggled so thoroughly to assess his own mental state. The Symptom Checklist-90 (SCL-90) is a brief, self-report questionnaire commonly used to assess a broad range of psychological symptoms and distress in adults. It includes 90 items that assess nine primary symptom dimensions: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. The SCL-90 has been shown to be a reliable and valid measure of psychological distress and can be used to screen for a variety of psychological disorders, such as depression, anxiety, and somatization disorders. Mr. David scored in the 99% percentile for interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism.

Brown Executive Function/Attention Scales-Adult (BEFAS-A) The BEFAS-A is a standardized assessment tool designed to measure executive functioning and attention in adults.

The Brown Executive Function/Attention Scales (Brown EF/A Scales) provide an easily understandable, standardized tool to collect information about the problems an individual demonstrates or reports with executive functions, the self-management functions that support attention in multiple tasks of daily life. Results are compared with norms to indicate how any reported problems over the past 6 months compared to other people of similar age. Individual scores indicate how much of a problem the adult appears to have with each of the clusters identified in the Brown model of EF. These clusters are as follows: Cluster 1. Activation: Organizing, Prioritizing, and Activating to Work, Cluster 2. Focus: Focusing, Sustaining, and Shifting Attention to Tasks, Cluster 3. Effort: Regulating Alertness, Sustaining Effort, and Adjusting Processing Speed, Cluster 4. Emotion: Managing Frustration and Modulating Emotions, Cluster 5. Memory: Utilizing Working Memory and Accessing Recall, Cluster 6. Action: Monitoring and Self-Regulating Action. Total Composite score is a composite of the six cluster scores. On these scales T-scores over 70 indicate markedly atypical presentation (i.e. very significant problems).

Mr. David's total composite score placed him in the severely affected range, with similarly severe impairments in focus (sustaining, and shifting attention to tasks), memory (Utilizing working memory and accessing recall) and worst of all, monitoring and self-regulating action.

Delis Rating of Executive Functions (D-REF)

The D-REF Adult consists of 58 items and takes 10–15 minutes to administer. Key components of executive functioning are generally conceptualized into four broad areas: goal formation,

planning, goal-directed behavior, and effective performance. For an individual to demonstrate adequate executive functioning, he/she must reflect on what it is he/she wants to accomplish, determine the next steps in order to achieve anticipated outcomes, engage in problem-solving behaviors to reach desired goal, and finally perform the action efficiently.

Mr. David scored in the 99th percentile (most affected) for impairments of behavioral and emotional control. Similarly, he scored in the 98-99th percentile on (1) Activity Level/ Impulse Control (AIC), an assessment of impulsivity, hyperactivity, and poor self-monitoring; (2) Emotional Control/ Anger Management (EAM), which assesses symptoms of poor frustration tolerance, emotional lability, sensitivity to criticism, and problems with anger control and (3) Abstract Thinking/ Problem-Solving (APS), which assesses symptoms of concrete thinking, cognitive rigidity, disorganization, and poor decision-making and problem-solving skills.

Millon Clinical Multiaxial Inventory-IV (MCMI-IV) Mr. David was administered the MCMI-IV to more fully explore his personality structure, antisocial or otherwise. The MCMI-IV is a multi-axial assessment tool that provides information on several domains of psychological functioning, including personality traits, clinical syndromes, and severe personality pathology. It also provides information on a patient's overall level of functioning, as well as their interpersonal style, coping mechanisms, and stressors. The test consists of 195 true/false questions that assess a wide range of psychological symptoms, including mood disorders, anxiety disorders, substance abuse, and personality disorders. The test is designed to be completed by adults aged 18 years or older and is commonly used by mental health professionals in clinical and forensic settings. One unique aspect of the MCMI-IV is that it assesses both the patient's self-reported symptoms and their coping styles, allowing clinicians to gain insight into how the patient perceives and deals with their problems. The MCMI-IV has been extensively researched and has demonstrated high levels of reliability and validity. It is widely used in clinical settings as a tool for diagnosing and planning treatment for patients with mental health disorders. However, it should be noted that the MCMI-IV is not a diagnostic tool on its own and only used in conjunction with other assessments and clinical evaluations.

Mr. David's response profile was processed by Pearson Assessments and the abridged reports is as follows: In sum, the major complaints expressed by the patient's MCMI-IV responses do not take the form of distinct clinical syndrome symptoms (i.e. no DSM-5 specified personality disorder like antisocial or borderline), however, he had traits of a turbulent and sadistic (aggressive) style. His response pattern showed no evidence to suggest dissimulation.

DISCUSSION

Decades ago, Mr. David lapsed into a coma after being struck by a motor vehicle while walking across the street. After regaining consciousness weeks later he became far more impulsive, irritable and exhibited profound short-term memory deficits, what his sister described as being a "different person," personality-wise. Given Mr. David's behavioral history it is shocking that no brain imaging was performed prior to the current evaluation. Functional and structural brain MR

imaging reveals damage to the left frontal lobe that is so severe that it is obvious to even the untrained eye (Figure 2). Quantitative analysis of these images revealed more loss of brain mass in the frontal and temporal lobes.

The frontotemporal region is a network functional circuits operating in concert to produce what is termed *executive function*. Executive function comprises the mental processes that enable us to plan, focus attention, remember instructions, and juggle multiple tasks successfully. Just as an air traffic control system at a busy airport safely manages the arrivals and departures of many aircraft on multiple runways, the brain needs this skill set to filter distractions, prioritize tasks, set and achieve goals, and control impulses. Conversely, damage to the executive system often leads to: Difficulty organizing; Difficulty in planning and initiation (getting started); Inability to multitask; Difficulty with verbal fluency, Trouble planning for the future; Difficulty processing, storing, and/or retrieving information; Mood swings; Lack of concern for people and animals; Loss of interest in activities; Socially inappropriate behavior; Inability to learn from consequences from past actions; Difficulty with abstract concepts (the inability to make the leap from the symbolic to the real world)

Damaging either a specific subregion of frontotemporal cortex or the connections between subregions will impair executive function. This is well illustrated by the case of Phineas gage, arguably the most famous neurological patient of all time. In brief, an explosion propelled a metal rod through his left frontal lobe, but leaving the rest of his brain otherwise intact. Dr. JM Harlow who attended to Gage's wounds reported that Gage's employers, "*who regarded him as the most efficient and capable foreman ... considered the change in his mind so marked that they could not give him his place again.... He is fitful, irreverent, indulging at times in the grossest profanity (which was not previously his custom), manifesting but little deference for his fellows, impatient of restraint or advice when it conflicts with his desires.... A child in his intellectual capacity and manifestations, he has the animal passions of a strong man.... His mind was radically changed, so decidedly that his friends and acquaintances said he was 'no longer Gage.'*" There is an undeniable similarity between the behavior of Gage and Mr David after his accident.

Frontotemporal dementia (FTD) can serve as a model to understand the context and scope of Mr. David's deficits. Mr. David has compromised frontal and temporal lobes, as revealed by quantitative MR imaging. This would be expected to produce deficits and behaviors that are most similar to those exhibited by patients suffering from frontotemporal dementia (FTD). Patients with FTD (1) struggle to focus on tasks and become distracted easily (2) find it difficult to plan, organize and make decisions – these problems may first appear at work or with managing money; (3) lose their inhibitions – behaving in socially inappropriate ways and acting impulsively or without thinking. For example, making insensitive or rude comments about someone's appearance, making sexual gestures in public, staring at strangers, or being verbally or physically aggressive; (4) lose motivation to do things that they used to enjoy; (5) lose the ability to understand what others might be thinking or feeling – they may be less considerate of the needs of others, lose interest in social activities or be less friendly. They may also have less of a sense of humor or laugh at other people's problems. This can make the person appear cold and selfish; (6) show repetitive or obsessive behaviors; (7) developing cravings or insatiable eating, drinking, smoking or other drug use. It is instructive to recognize that the symptoms of FTD are often misunderstood. Other may think that the person is merely misbehaving, leading to anger and

conflict. It is important to understand that people with these disorders often lack any awareness of their illness and either cannot control their behaviors or can only do so for short periods of time.

Mr. David’s brain damage underlies his apparent lack of executive functioning. Because the frontotemporal regions are so complex in their function it is outside the bounds of this interim report to discuss in detail all of the aspects of Mr. David’s cognition and behavior that will be affected. However, two anatomically easily illustrated examples would be impaired memory and his seemingly lack of forethought. First, as illustrated in Figure 2, he has significant damage to the dorsomedial prefrontal cortex (dmPFC). This region is directly required for working memory. The extent of the damage easily explains his partial amnesia after his accident. It is important to keep in mind that working memory is more than remembering facts since it is what allows us to perform calculations or evaluate prospective outcomes for our decisions.

Patients like A.D. with frontal lobe damage are known to demonstrate deficits in planning actions for tasks that require foresight. Foresight and future thinking require the ability to think about the self and to focus attention on one’s inner experience. When an individual reflects on their own mental state, infers the mental state of others, or engages in social reasoning they activate the dorsomedial prefrontal cortex (dmPFC) subsystem includes the dmPFC proper, the temporoparietal junction, the lateral temporal cortex, and the temporal pole. This region (dmPFC) is the most obviously damaged in Mr. David (Figure 2), but not the only dysfunctional circuit. This is supported by the limited psychometric testing Mr. David has thus far been able to complete. Mr. David scored in the severe affected/impaired range

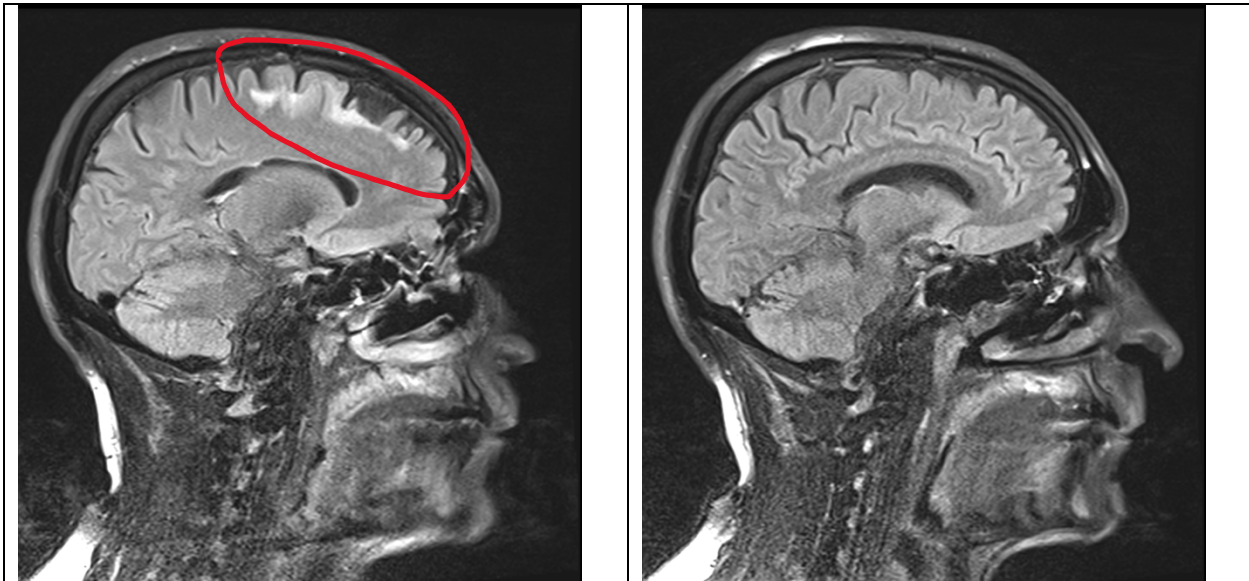


Figure 2 (LEFT). Sagittal FLAIR images of A.D. showing encephalomalacia and glial scarring in left dorsomedial prefrontal cortex (dmPFC) . (RIGHT) Undamaged right frontal lobe from same sequence.

SUMMARY OF FINDINGS

On initial interview, Mr. David presented with a labile mood, digressive thought process and perseveratively espoused numerous bizarre beliefs, but denied all past medical history and drug use over the past two weeks. His behavior pattern appeared most consistent with an early-onset mid-stage behavioral variant frontotemporal dementia, prompting me to order brain imaging. I subsequently learned that decades earlier Mr. David suffered a severe traumatic brain injury, which was confirmed on MRI. Initial psychometric testing revealed broad, mostly severe, dysfunction across all sphere of executive function, including emotional dysregulation, behavioral dysregulation, impaired attention & memory, impaired practical problem solving ability and diminished impulse control.

SUMMARY OF DIAGNOSES

1. S06.2XAS Diffuse traumatic brain injury with loss of consciousness of unspecified duration,
2. R45.89 Impairing Emotional Outbursts
3. F02.C18 Major Neurocognitive Disorder Due to Traumatic Brain Injury, Severe, With other behavioral or psychological disturbance

OPINONS¹

1. Mr. David suffered a major traumatic brain injury
 2. Mr. David's TBI resulted in permanent damage to and loss of brain structures
 3. Mr. David has the behavioral manifestation predicted by an injury to this brain region
 4. Psychometric testing affirmatively documents broad impairments in Mr. David's executive functioning.
 5. Mr. David lacked objective evidence of enduring brain damage prior to this evaluation
 6. Mr. David's brain damage compromised his insight and ability to introspect
 7. Lack of objective evidence, insight and introspective ability prevented him from recognizing his functional deficits.
 8. Mr. David's neurological deficits render him permanently disabled.
 9. Mr. David should be afforded reasonable accommodations as he suffers from a heretofore unrecognized medical disability.
 10. Mr. David's accommodations should include mechanisms that reduce the need for sustained vigilance (e.g. shorter session, or more frequent breaks, especially when emotions are likely to be activated, but more frequent sessions)
- Note: The full extent of the data and opinions in this report should be open to amendment pending the completion of neuropsychological testing.

¹ Mr. David has not fully completed all intended testing. Pending the completion of neuropsychological testing, the opinions expressed are subject to revision.