I28   Functional Magnetic Resonance Imaging (fMRI): Role In Forensic Psychiatry

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After attending this presentation, attendees will be able to: appreciate the history of functional magnetic resonance imaging, basic concepts, and how it works; understand the advantages of functional magnetic resonance imaging and basic research findings; understand the role of functional MRI as court evidence; and learn about the current and potential future uses of functional MRI in forensic psychiatry.

This presentation will impact the forensic science community by discussing how Blood Oxygen Level Dependant functional Magnetic Resonance Imaging (BOLD fMRI), is a newly developed diagnostic modality, which indirectly measures the brain activity during different brain functions, by measuring the blood flow to a particular areas of brain and hence localizes the areas involved in a specific act or behavior including, sociopathy, lying, pedophilia, or other crimes.

This principle is based on the long known fact that when a certain part of brain functions during brain activity, it uses up oxygen at a higher rate than its surroundings. To compensate this deficit, more oxygen is delivered to that part of brain via increased blood flow. This difference in blood oxygen level is picked as a signal by functional magnetic resonance imaging. Functional magnetic resonance imaging has become a topic of interest for forensic experts. There is a great deal of ambiguity regarding the use of functional magnetic resonance imaging as court evidence.

A literature search in duration ranging from 1991 to 2010 was performed. Pub med, Psychiatry online, and Internet web was explored. The search was limited to English language. The search words used were functional MRI and Forensic psychiatry, functional MRI and Sociopathy, functional MRI and Lie detection, functional MRI and Pedophilia and functional MRI in court proceedings. Several countries have been identified that carried out and published this kind of research including the United States, United Kingdom, Germany, France, Switzerland, and Israel.

Number of total articles, publications and abstracts obtained with the search and considered relevant were 177. Many articles have discussed the use of functional MRI in finding neurological basis for sociopathy, lying, pedophilia and mock crimes and have consistently shown functional MRI as useful tool in mapping neurological basis of behaviors.

BOLD fMRI is an imaging modality, which can show brain functioning during thought processes and behaviors. FMRI is safe with no radiation exposure, BUT expensive. Despite all the caveats, questions and concerns, BOLD imaging is well correlated with results from other methods of measuring brain activity. BOLD fMRI currently being used in psychopharmacological research and may potentially be used to track treatment outcomes: for example repetitive trans cranial magnetic stimulation (**rTMS)** or psychotherapies etc. BOLD fMRI can be used to find the neural basis correlates of the neuro-psychiatric illnesses including, sociopathy, pedophilia, aggressive and lying behaviors. BOLD fMRI is being used for Lie detection but with skepticism. With increasing frequency, criminal defense attorneys are integrating neuro-imaging data into hearings related to determinations of guilt and sentencing mitigation. This is of concern, since not all brain lesions and abnormalities indicate a compromised mental state that is relevant to knowing whether the act was wrong at the time of commission, and juries may be swayed by neuro-scientific evidence that is not relevant to the determination of the legal question before them. It is important to emphasize that the use of imaging studies in forensic

matters requires a careful scientific foundation and a rigorous legal assessment.

fMRI, BOLD fMRI, BOLD fMRI in Forensic Psychiatry