

Thalamic N-Acetyte Aspartate : Creatine ratio in Schizophrenic Male Patients

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Abstract:

Objective To Find out the ratio between the concentrations of N-Acetyte Aspartate and Creatine in the Thalamic regions of Schizophrenic patients, using Proton Magnetic Resonance Spectroscopic Imaging, and find out its correlation with different clinical variables. **Method** The study included 24 Schizophrenic patients, assessed according to the ICD-10 Checklist Criteria, The Scale for assessment of Positive symptoms (SAPS), and The Scale for assessment of Negative symptoms (SANS). N-Acetyte Aspartate Creatine ratio (N-AA/ Cr) was measured in the thalamic regions and was compared with 10 age and sex matched healthy comparison subjects. **Results** There is strong evidence that suggest neuronal dysfunction and or loss in thalamic regions in male Schizophrenic patients, results will be discussed in details.

Introduction:

Despite a hundred years research the neuro-pathology of schizophrenia remains obscure. One of the most famous arguments about the etiology is whether Schizophrenia is a functional or structural abnormality or both? A number of structural abnormalities have been identified by structural imaging; The Computerized Tomography (CT) and Magnetic Resonance Imaging (MRI) (1). There are several candidates for the histological and molecular correlates of the macroscopic features. The probable explanation for decreased cortical volume is reduced neuropil and neuronal size rather than a loss of neurons. These morphometric changes are in turn suggestive of alterations in synaptic-dendritic and axonal organization, a view supported by immuno- cyto-chemical and ultra-structural pathological findings (2). Another debate about the etiology is the inconsistent results of the studies about whether Schizophrenia is a neuro- developmental vs. neuro-degenerative disorder. Gliosis is not an intrinsic feature, its absence supports but does not prove the prevailing hypothesis that schizophrenia is a disorder of prenatal Neuro-development, while the cognitive impairment which frequently accompanies schizophrenia is not due to other Neuro-degenerative disorder, and its basis is still unknown. Also the controversy of global vs. focal pathology, cortical vs. sub-cortical regions,

and the exact discrimination of grey- white matter pathology in Schizophrenia is still an important field of study, yet most of the evidences about the pathology of schizophrenia reflects aberrant activity in and integration of the components of distributed circuits involving the prefrontal cortex (3), hippocampus (4), thalamus (5, 6, 7), and basal ganglia (8, 9). These facts give rise to the major role of functional imaging, in general, in studying in vivo the relation ship between altered cerebral activation patterns and the psychopathologic and cognitive features. Magnetic Resonance Spectroscopy (MRS) is a non- invasive investigative technique, it has the ability to measure all the neuro-chemical changes occurring inside the brain tissues, to measure tissue metabolites, and to detect a wide range of nuclei , it also may assist in characterizing high-risk population, medication level and therefore guide medication use (10) MRS results are provided in the form of spectrum (graphs and not images) . There are two main types :
a- Proton MRS : (¹H-MRS): It can measure the N- Acetyte Aspartate (NAA), Creatinine, Choline, Glutamate,
b- Phosphorous MRS: (P-MRS): It can measure Phosphorous containing compounds eg: Phospho-lipids, ATP, ... (11). Other nuclei have also been studied by MRS in various organs like C13, F19 and Na23