Direct evidence of viral infection and mitochondrial alterations in the brain of fetuses at high risk for schizophrenia

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Introduction

There is increasing evidences that favor the prenatal beginning of schizophrenia. The main point towards intra-uterine environmental factors that act specifically during the second pregnancy trimester producing an immediate damage of the brain of the fetus. The availability of technology doesn't allow observing what is happening at cellular level since the human brain is not exposed to a direct analysis in that stage of the life in subjects at high risk of developing schizophrenia. Methods. In 1977 we began an immediate microscopy research of the brain of fetuses at high risk from schizophrenic mothers so as to finding differences at cellular level in relation to controls. Results. In these studies we've observed within the nuclei of neurons the presence of complete and incomplete viral particles that reacted in positive form with antibodies to herpes simplex hominis type I virus, and mitochondria alterations. Conclusion. The importance of those findings can have practical applications within the prevention of the illness keeping in mind its direct reference to the aetiology and physiopathology of schizophrenia. A study of amnionic fluid cells in women in danger of getting a schizophrenic offspring is taken into account . Of being observed an equivalent alterations that those observed previously within the cells of the brain of the studied foetuses, it might shall these women in risk of having a schizophrenia descendant, previous information of the results, the voluntary medical interruption of the pregnancy or an early anti HSV1 viral treatment as
preventive measure of the later development of the illness.

Schizophrenia is a severe psychiatric disorder affecting approximately 1% of the world's population with an incidence of 0.2 per 1000 per year. Schizophrenia has a higher incidence in males than females, with a male:female ratio of 1.4, with an early mean onset at age 20 in males, compared to age 25 in females. Currently, a diagnosis of schizophrenia is based on behavioral criteria that requires the patient to experience two or more of the following symptoms for a significant duration over a 1 month period: positive symptoms, negative symptoms (avolition, apathy, asociality), and disorganization symptoms (grossly disorganized or catatonic behavior, disorganized speech, incoherence). However only one symptom is required if the individual experiences bizarre delusions, auditory hallucinations commentating on the patient's behavior or thoughts, or two or more voices conversing with one another.

One of the most rapidly changing fields is genetics. Family, twin, and adoption studies have clearly shown that genes play a prominent role in the development of schizophrenia. Estimates of heritability typically range from 50 to 85 percent. Initial attempts to isolate major genes using linkage studies were unsuccessful, but newer approaches using increasingly sophisticated methods have uncovered several chromosomal regions which will harbor genes of minor effect. It seems likely that schizophrenia is that the results of the interaction of the many genes, a number of which also interact with environmental factors. None of these have been definitively shown to be causative. It is possible that different combinations of genetic and environmental factors affect specific neurobiological systems, resulting in a final common pathway of neural dysfunction. Several neurobiological abnormalities are found to possess major implications for understanding the pathophysiology of schizophrenia. The first are structural brain abnormalities. Initially seen decades ago using pneumoencephalography, structural changes are more clearly delineated using computed tomography (CT) and resonance imaging (MRI). The most commonly reported alterations include enlarged lateral ventricles, enlarged third ventricle, and reduced volume of a number of structures, including hippocampus, amygdala, and frontal and temporal cortices. These abnormalities may predate the onset of illness. Second, functional cortical deficits have been seen with a variety of techniques, such as

neuroimaging and neuropsychological testing. Prefrontal and temporal lobe dysfunction is most prominent, and is possibly related to structural abnormalities. Third, neuropathological studies have consistently failed to find any evidence of gliosis to account for the structural deficits. If anything, they have a tendency to seek out subtle cytoarchitectural alterations. The recurring theme of this research suggests some sort of failure in neuronal migration, orientation, or connectivity. Finally, several neurotransmitter systems appear to play a task , particularly within the expression of positive also as negative psychotic symptoms. Evidence for alterations in the dopamine system is the most compelling. Other neurotransmitters have also been implicated, including glutamate, serotonin, and γaminobutyric acid (GABA). Neurochemical, structural, and functional imaging abnormalities are often understood within the context of the neural circuits involved and models of the illness. Cortico-striato-thalamic, limbic, and dopamine systems all appear to play a task . These three interconnected pathways mediate different aspects of higher-level information science , like judgment, memory, planning, and motivation. Their involvement could arise in several ways. One model suggests that neurodevelopmental abnormalities occur in utero. The clinical manifestations of schizophrenia appear only after brain development is essentially completed, in late adolescence. Although this hypothesis has come to dominate brooding about schizophrenia, the neurodevelopmental model has several weaknesses.

Genetic Factors Family, twin, and adoption studies indicate that there is a major heritable component to schizophrenia. Whereas the incidence in the normal population is approximately 0.5 to 1 percent, the lifetime risk in first-degree relatives is roughly 10 percent, indicating that the risk to first-degree relatives is 10 times that of the general population. This strongly implicates a familial factor in the etiology of the illness. Twin and adoption studies have shown that this is mostly, if not entirely, due to genetic factors. For example, the concordance rate in monozygotic twins is approximately 50 percent, as compared to 14 percent for dizygotic twins, suggesting that heritability may be as high as 80 percent. Of seven adoption studies, all found an increased incidence of schizophrenia in biological relatives, but not in adoptive relatives. This data convincingly demonstrates that genetic factors rather than shared, familial environmental factors are at work. The neurological basis of schizophrenia remains obscure despite an increased number of techniques applied for further investigation.

Biography

Segundo Mesa Castillo. As Specialist in Neurology, he worked for 10 years in the Institute of Neurology of Havana, Cuba. He has worked in Electron Microscopic Studies on Schizophrenia for 32 years. He was awarded with the International Price of the Stanley Foundation Award Program and for the Professional Committee to work as a fellowship position in the Laboratory of the Central Nervous System Studies, National Institute of Neurological Diseases and Stroke