

Tractography Analysis of the Evolutionary Origin of Schizophrenia

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Abstract : A substantial number of traditional medical research has been put forward to managing and treating mental disorders. At the present time, to our best knowledge, it is believed that fundamental understanding of the underlying causes of the majority psychological disorders needs to be explored further to inform early diagnosis, managing symptoms and treatment. The emerging field of evolutionary psychology is a promising prospect to address the origin of mental disorders, potentially leading to more effective treatments. Schizophrenia as a topical mental disorder has been linked to the evolutionary adaptation of the human brain represented in the brain connectivity and asymmetry directly linked to humans higher brain cognition in contrast to other primates being our direct living representation of the structure and connectivity of our earliest common African ancestors. As proposed in the evolutionary psychology scientific literature the pathophysiology of schizophrenia is expressed and directly linked to altered connectivity between the Hippocampal Formation (HF) and Dorsolateral Prefrontal Cortex (DLPFC). This research paper presents the results of the use of tractography analysis using multiple open access Diffusion Weighted Imaging (DWI) datasets of healthy subjects, schizophrenia-affected subjects and primates to illustrate the relevance of the aforementioned brain regions connectivity and the underlying evolutionary changes in the human brain. Deterministic fiber tracking and streamline analysis were used to generate connectivity matrices from the DWI datasets overlaid to compute distances and highlight disconnectivity patterns in conjunction with other fiber tracking metrics; Fractional Anisotropy (FA), Mean Diffusivity (MD) and Radial Diffusivity (RD).

Keywords : tractography, evolutionary psychology, schizophrenia, brain connectivity

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