Aberrant topology of striatum’s connectivity is associated with the number of episodes in depression.

Abstract:

In major depressive disorder, depressive episodes reoccur in ~60% of cases; however, neural mechanisms of depressive relapse are poorly understood. Depressive episodes are characterized by aberrant topology of the brain's intrinsic functional connectivity network, and the number of episodes is one of the most important predictors for depressive relapse. In this study we hypothesized that specific changes of the topology of intrinsic connectivity interact with the course of episodes in recurrent depressive disorder. To address this hypothesis, we investigated which changes of connectivity topology are associated with the number of episodes in patients, independently of current symptoms and disease duration. Fifty subjects were recruited including 25 depressive patients (two to 10 episodes) and 25 gender- and age-matched control subjects. Resting-state functional magnetic resonance imaging, Harvard-Oxford brain atlas, wavelet-transformation of atlas-shaped regional time-series, and their pairwise Pearson's correlation were used to define individual connectivity matrices. Matrices were analysed by graph-based methods, resulting in outcome measures that were used as surrogates of intrinsic network topology. Topological scores were subsequently compared across groups, and, for patients only, related
with the number of depressive episodes and current symptoms by partial correlation analysis. Concerning the whole brain connectivity network of patients, small-world topology was preserved but global efficiency was reduced and global betweenness-centrality increased. Aberrant nodal efficiency and centrality of regional connectivity was found in the dorsal striatum, inferior frontal and orbitofrontal cortex as well as in the occipital and somatosensory cortex. Inferior frontal changes were associated with current symptoms, whereas aberrant right putamen network topology was associated with the number of episodes. Results were controlled for effects of total grey matter volume, medication, and total disease duration. This finding provides first evidence that in major depressive disorder aberrant topology of the right putamen's intrinsic connectivity pattern is associated with the course of depressive episodes, independently of current symptoms, medication status and disease duration. Data suggest that the reorganization of striatal connectivity may interact with the course of episodes in depression thereby contributing to depressive relapse risk.