Dorsal anterior insula (dAI)

Dorsal anterior insula region with connections to frontal, anterior cingulate, and parietal areas is involved in cognitive control processes, a ventral anterior insula (vAI) subdivision has connections with limbic areas and is involved in affective processes, and a mid-posterior insula (PI) subdivision has connections with brain regions for sensorimotor processing [1) 2) 3)].

Using dynamic functional network connectivity (dFNC) analyses to examine time-varying properties of interactions between insular subdivisions and other brain regions, it has been demonstrated that the dAI exhibits more variable connections than the other insular subdivision [4)].

The insula, consisting of functionally diverse subdivisions, plays a significant role in Parkinson's disease (PD)-related cognitive disorders. However, the functional connectivity (FC) patterns of insular subdivisions in PD remain unclear. The aim of Pan et al. is to investigate the changes in FC patterns of insular subdivisions and their relationships with cognitive domains. Three groups of participants were recruited in this study, including PD patients with mild cognitive impairment (PD-MCI, n = 25), PD patients with normal cognition (PD-NC, n = 13), and healthy controls (HCs, n = 17). Resting-state functional magnetic resonance imaging (rs-fMRI) was used to investigate the FC in insular subdivisions of the three groups. Moreover, all participants underwent a neuropsychological battery to assess cognition so that the relationship between altered FC and cognitive performance could be elucidated. Compared with the PD-NC group, the PD-MCI group exhibited increased FC between the left dorsal anterior insular (dAI) and the right superior parietal gyrus (SPG), and altered FC was negatively correlated with memory and executive function. Compared with the HC group, the PD-MCI group showed significantly increased FC between the right dAI and the right median cingulate and paracingulate gyri (DCG), and altered FC was positively related to attention/working memory, visuospatial function, and language. The findings highlighted the different abnormal FC patterns of insular subdivisions in PD patients with different cognitive abilities. Furthermore, dysfunction of the dAI may partly contribute to the decline in executive function and memory in early drug-naïve PD patients [5)].

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