Discrepant Resting-state Brain Activity in Geriatric Depression and Depressed Parkinson¡¯s disease: A Resting-State fMRI Study

Yingying Yin[1], Yonggui Yuan[2], Zhenghua Hou[3], and Weiguo Liu[4]

[1]Neuropsychiatry, School of Southeast University, Nanjing, Jiangsu, China, [2]Affiliated ZhongDa Hospital of Southeast University, and Institute of Neuropsychiatry of Southeast U, Jiangsu, China, [3]The 4th People¡¯s Hospital of Wuhu City, Anhui, China, [4]Nanjing Brain Hospital affiliated to Nanjing Medical University, Jiangsu, China

Purpose: During the last decades, imaging findings have improved our understanding of the neural circuits underlying mood and the development of depression. Depression in aged people seriously affected the quality of life in the elderly. Depressed Parkinson's disease (DPD) and Geriatric depression (GD) are two common diseases which may share identical or discrepant biological indicators, which is greatly worth to explore. We aimed to investigate the differences in resting-state brain activity of depressed Parkinson's disease (DPD) and Geriatric depression (GD).

Methods: 19 DPD, 26 GD and 26 gender-, age-, and education-matched normal controls (NC) were recruited. Hamilton Depression Rating Scale (HDRS) was used to evaluate the depressive symptoms of DPD and GD patients. Unified Parkinson's Disease Rating Scale Ⅲ (UPDRSⅢ) and Hoehn-Yahr (H-Y) Scale were used to evaluate the motor symptoms and the severity of DPD patients respectively. Then regional homogeneity (ReHo) analysis was applied to explore the resting-state brain activity in all subjects. One-way analysis of covariance (ANCOVA) was performed to identify possible ReHo value differences among the three groups. Correlation analyses were also performed to investigate the relationship between depression or Parkinson severity and the ReHo value of the significant different brain regions.

Results: The result of One-way ANCOVA exhibited four significantly different brain areas (i.e. dorsolateral prefrontal cortex (DLPFC), precuneus (PCu) and supplementary motor area (SMA), and posterior cingulate cortex (PCC)) (figure 1). After post hoc analysis, we found that DPD subjects had decreased ReHo in the left SMA and increased ReHo in the rest three brain areas relative to both GD and NC ones. GD patients had decreased ReHo in the left DLPFC and increased ReHo in the right PCC relative to NC ones (figure 2).

Conclusions: The abnormal resting-state brain activities, although not associated with the depression severity, are quite distinguishing between the DPD and the GD subjects. These discrepant resting-state brain activities between DPD and GD may be applied to identify the two diseases.

numbers below the images refer to the MNI z coordinates.
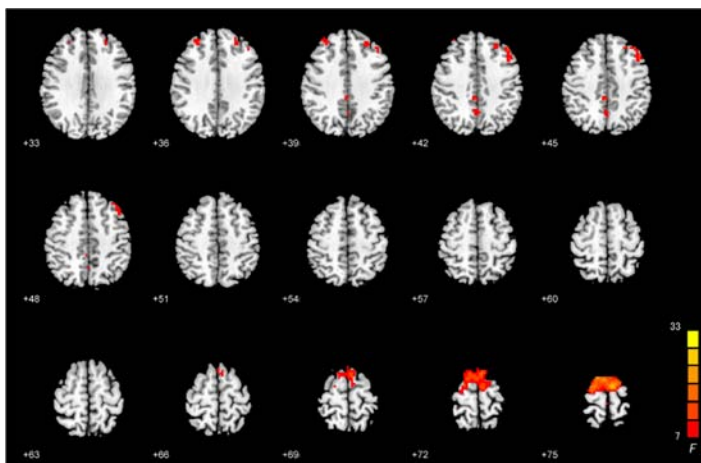

Figure 1. Statistical maps showing ANCOVA results of the ReHo maps among the three subject groups. A single voxel thresholds of the map resulting from the F-test was set at a $P < 0.01$, and a minimum cluster size of 486 mm^3 was used to correct for multiple comparisons, which yielded a corrected threshold of $P < 0.05$, determined by Monte Carlo simulation. Left in the figure indicates right side of the brain. The color bars indicate the F value from ANCOVA. The
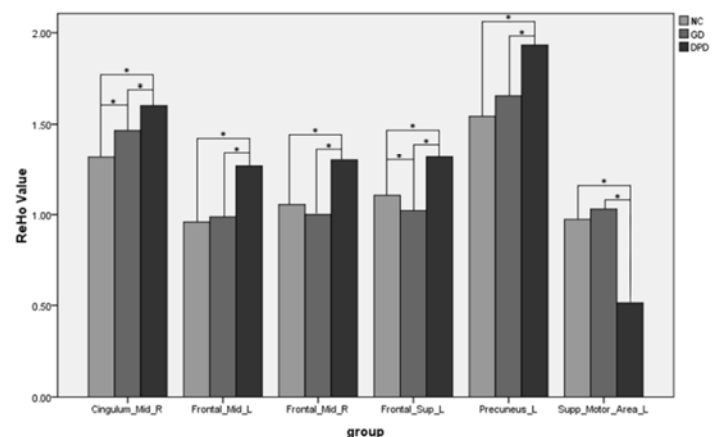

Figure 2. Histogram of post hoc tested of ANCOVA. Abbreviation: MNI, Montreal Neurological Institute space; R, right. L, left; Sup, Superior; Mid, Middle; Supp, supplementary; NC, normal control; GD, Geriatric depression; DPD, depressed Parkinson's disease