# Decreased Interhemispheric Functional Connectivity in first-episode drug-naïve Major Depressive Disorder

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## Purpose

Abnormalities in large-scale, structural and functional brain connectivity have been increasingly reported in patients with major depressive disorder (MDD) (1). We examined the resting state functional connectivity (RSFC) between the two hemispheres and its relationships with clinical characteristics in MDD patients using a recently proposed measurement named ‘‘voxel-mirrored homotopic connectivity (VMHC)’’.

## Methods

Twenty-three first-episode, medication-naive patients according to DSM-IV, were compared with twenty gender- and age-matched controls. Twenty-four axial slices covering whole brain were acquired using a 3.0T Philips Achieva scanner (TR/TE 2000/35 ms, matrix 64 × 64, FOV 24 cm, thickness/gap 5/1mm, total 200 volumes). Data preprocessing was performed in DPARSF, The steps included slice timing, head-motion correction, spatial normalization, smoothed with a Gaussian kernel of 6 mm at full-width at half-maximum (FWHM), linear drift, filtered (0.01–0.08 Hz). The VMHC computation was performed using DPARSF software. The homotopic RSFC was computed as the Pearson correlation coefficient between each voxel’s residual time series and that of its symmetrical interhemispheric counterpart. Correlation values were then Fisher z-transformed to improve normality. The resultant values constitute the VMHC and were used for the group analyses. The differences in VMHC between patients and control were performed using two-tailed t-test ($P < 0.01$, alphasim corrected).

## Results

There were no significant differences between MDD patients and healthy controls in gender, age, or years of education. Compared to the controls, the MDD patients showed significant decreased VMHC in many brain areas, including: superior frontal gyrus, middle frontal gyrus, inferior frontal gyrus, hippocampus, parahippocampa gyrus, middle temporal gyrus, insula, putamen, caudate, middle occipital gurus, parietal lobe and precuneus (Fig.1). No increased VMHC were found as MDD patients compared with normal controls.

## Discussion and Conclusion

We found reduced interhemispheric functional connectivity in patients with MDD during resting state. A decrease in interhemisphere RSFC of the frontal lobue give some evidence to suggest impairment in a series of cognitive functions in MDD (2,3).A decrease in interhemisphere RSFC of the parahippocampal gyrus may be contributing to the emotional symptoms and memory deficits observed in MDD (4). If decreased RSFC in insula suggest abnormal salience network in MDD need further research. These findings suggest that the functional coordination between homotopic brain regions are impaired in MDD patients. Furthermore these impaired long-range connections likely reflect failure functional networks integration process in MDD (5).

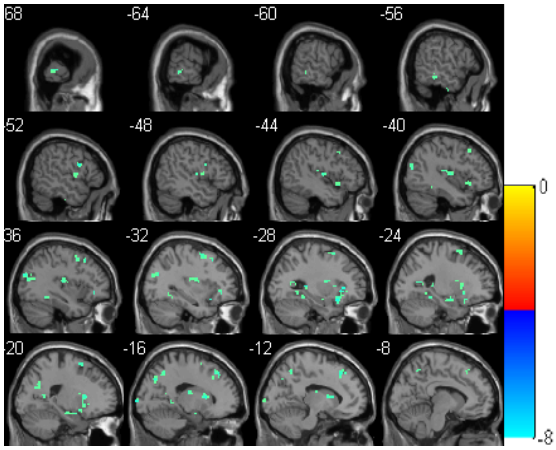


**Fig1**. *Regions showing significant differences in VMHC between MDD patients and healthy controls. Blue colors indicate reduced VMHC in patients compared to the controls*

## References

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