

CONCENTRATION CHANGES OF WHOLE BRAIN GRAY AND WHITE MATTER IN CHILDREN PATIENTS WITH TOURETTE SYNDROME: EVIDENCE FROM VOXEL-BASED MORPHOMETRY

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Background and aims: Pathophysiological evidence suggests an involvement of fronto-striatal circuits in Tourette syndrome (TS). To identify TS related abnormalities in gray and white matter, we used optimized voxel-based morphometry (VBM) and provide a quantitative measure of concentration.

Methods: Three dimensional T1-weighted MRI were acquired in 31 TS children(28 boys,3 girls, mean age= 8.4 years, range 2-15 years) and 50 age-matched controls on a 1.5 Tesla Philips scanner. Images were analyzed using a version of VBM2 in SPM2.

Results: Using VBM, TS patients showed significant increases in gray matter concentrations in prefrontal areas, sensorimotor areas , hippocampus, the left posterior cingulate gyrus, right caudate nucleus and parietal-occipital association cortex bilaterally. Decreases in gray matter concentrations were seen in medulla oblongata and left pons. Decreases in white matter concentrations were found in right thalamus, right caudate nucleus, right orbitofrontal structures, left anterior cingulate gyrus, left precentral and postcentral gyrus. Increases in white matter concentrations were detected in pons and anterior midbrain($P < 0.05$),. Tic severity was no correlated with any concentration changes of gray and white matter in brain. Tic course was negatively correlated with right caudate nucleus($P = 0.003$) and the left posterior cingulate gyrus ($P = 0.044$) .

Conclusions: Our MRI *in vivo* neuropathological findings support the hypothesis that alterations in frontostriatal circuitries underlie TS pathology. We also suggest that abnormalities of frontal- parietal-occipital regions , limbic system and brain stem are associated with TS. Dection in changes of gray and white concentrations may be helpful for the early diagnosis and evaluation of TS.