

White matter of cerebellum in normal subjects and Parkinson's disease patients

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Diffusion tensor imaging (DTI) could be useful in order to study movement disorders because it is possible to verify variations between several functional circuits simultaneously with a non-invasive approach. Improving DTI method with Constrained Deconvolution System (CDS), it is possible to solve many limitations of this technique. We decided to use CSD approach in order to demonstrate a cerebellar involvement in Parkinson's Disease (PD), based on hypotheses already made by other authors. Twenty-six patients with PD were studied with a 3 Tesla MRI CSD protocol, with five more control subjects. We obtained Fractional Anisotropy Map (FA) from all patients and we adopted a quantitative analysis of color-signal pixel by pixel. With this method we could study fiber directions of each pixel for each cerebellar slice of each patient. We compared measurements obtained with control subjects. The latter had more red pixels compared to green and blue pixels.

PD patients showed less red pixels compared to control subjects. In some cases, green pixels were more than red. This was a clear demonstration of a different colorimetric signal behavior between PD patients and controls.

We advanced the hypothesis that cerebellum undergoes a loss of the ability to analyze and modify informations, because the reduction of red signal (latero-lateral direction) in PD patients, compared to controls, could mean that informations may be in transit for less time into reverberating circuits of cerebellar folia.

Key words

DTI, CDS, Parkinson's disease.