EFFECT OF MULTICHANNEL INVERSE SCALING DENOISING IN DETECTION OF INJURED WHITE MATTER IN FRACTIONAL ANISOTROPY MAPS

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Introduction: In research of Parkinson Disease (PD), using VBM on Fractional Anisotropy (FA) maps, the most common preprocessing step used nowadays is Gauss filter. There are more advanced denoising models that can improve the detection of white matter (WM) alterations.

Aims: To study the effects of a nonlinear multichannel filtering preprocessing step on VBM statistical study over FA maps.

Material and methods: Diffusion Weighted Images (DWI) of fourteen subjects with PD diagnosis and fifteen healthy subjects were acquired on a 3T scanner. Prior to diffusion tensor estimation, an iterative process, called 'inverse scale space', was used to filter the DWI. The statistical method used was VBM that was performed with SPM8 package.

Results: The above process shows an improvement over FA maps (Figure.a: FA maps of two slices with and without preprocessing) and differences at the statistical study were found. Applying the described process, affected WM fibers tracts in PD subjects are better defined (Figure.b: Injured external capsule WM fibers tracts with and without preprocessing). Also the cluster level extend and the height peak level thresholds are increased.

Conclusions: Using 'inverse scale space’ iterative scheme as a preprocessing step improves the results of VBM statistical study over FA.