

Diffusion Tensor Imaging with Free Water Elimination

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At the University of Wisconsin-Madison

March 5, 2015

Diffusion Imaging has become a mainstay amongst neuroimaging methods. However, there is a paradox common to diffusion methods. While the measured signal is generated from displacements on the order of tens of micrometers voxel sizes are typically 2–3 mms per side. Due to limitations in the achievable signal to noise ratio relatively large voxels will likely remain standard in the field.

In turn, the resolution limits ensure that voxels at the interfaces between tissue and cerebral spinal fluid (CSF) will inevitable contain a mixture of both materials. This work sets out to deal with this situation of partial volumed voxels by modelling and removing the signal due to CSF.

This was accomplished by rigorously establishing an optimal protocol and robust fitting scheme, validating the method through *in vivo* tractography, and then applying the free water elimination technique to a group of individuals at risk for Alzheimer's disease and comparing results to those of the standard diffusion tensor imaging method.