

Integrated Software for the Assessment of Diffusion Tensor Imaging of Brain Wiring in Alzheimer's Disease and Dementia

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Contact information of lead PI Country

Canada

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Integrated Software for the Assessment of Diffusion Tensor Imaging of Brain Wiring in Alzheimer's Disease and Dementia

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CIHR

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3

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Research Abstract

Multi-centre studies of Alzheimer's Disease and dementia include magnetic resonance imaging (MRI) of the brain. MRI can provide a window to the status of the brain and make quantitative measurements that can then be compared to clinical data such as cognitive tests (e.g. memory), genetic anomalies, and biochemical markers to evaluate the relationships with brain structure and function. Major goals for imaging are to assess which brain regions are selectively involved

in the progression of dementia, to enable early diagnosis, and to provide predictive biomarkers. Much of the previous efforts of the Alzheimer's Disease Neuroimaging Initiative (ADNI-1) has been on images that assess lesions and volumes of substructures. However, follow-up studies (ADNI-2) have incorporated diffusion tensor imaging (DTI), an advanced and promising MRI method that can identify and measure white matter tracts and their connectivity in the brain. However, current DTI software packages have marked limitations for white matter tract-based analyses in large populations. This proposal builds upon our expertise as the leading DTI site in Canada and one of the top sites world-wide. Our group has developed novel DTI analysis methods to measure key white matter tracts in large numbers of patients; however, these have not been made widely available yet. Our methods have shown insight into white matter changes with aging over the lifespan, but they have not yet been applied to Alzheimer's Disease. The goal of this grant is to fund a research associate to develop integrated software modules to make these sophisticated DTI analyses usable by the community. We have been working for several years with the developers of two free publicly downloadable DTI software packages (ExploreDTI, A. Leemans, Utrecht, Netherlands and DTI-TK, H. Zhang, London, UK) where we will integrate our methods. Another goal is to show that these new methods detect unique white matter differences in Alzheimer's Disease.

Further information available at:

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Canada

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