

## **McGill University – Imperial College London Exchange Program**

### **Segmentation of the thalamus on MRI for volumetric measurement**

#### **Project summary**

The thalamus is an important component of a great many neuronal circuits within the human brain. Atrophy of the thalamus above and beyond general brain atrophy has been shown to occur in multiple sclerosis (MS), an inflammatory-demyelinating disease of the central nervous system with neurodegenerative aspects. The measurement of thalamic volume and volume change on serial MRI is useful both for improved understanding of disease mechanisms as well as for monitoring the effect of therapy in clinical trials. Within the Magnetic Resonance Spectroscopy Unit (P.I. Douglas L. Arnold) and the Image Processing Lab (P.I. Louis Collins) at the Montreal Neurological Institute, we have been developing and refining automated template-based methods to segment a number of brain structures, including the thalamus. For proper validation of the technique, we would like to compare the automated results with manual segmentation. Thus, the proposed project would be to segment an existing set of T1-weighted MRI data, identifying the thalamus according to existing rules and neuroanatomical landmarks. Given that the thalamic borders are not sharply defined on T1-weighted images, some modification to the existing rules for manual thalamic segmentation may be desirable to improve consistency and reproducibility. The final thalamic segmentations will be used to compare with the automated labels for validation of the automated approach. The ideal student for this project will have a keen interest in neuroanatomy and neurological diseases. Proficiency with computers and some experience with the Unix/Linux operating system would be assets.

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