PhD position - Announcement
(3-year doctoral scholarship)

Ex vivo Basal ganglia morpho-functional atlas obtained from ultra-high resolution Magnetic Resonance Imaging.

Abstract. The PhD candidate will develop a new atlas of the basal ganglia (BG) based on their morphological connectivity studied *ex vivo* by diffusion-weighted Magnetic Resonance Imaging (dMRI). Target localization for Deep Brain Stimulation (DBS) will benefit from such an atlas including morphological and functional data (neural networks). We will use a robust method (*Connectivity-Based Parcellation, CBP*) and two datasets already obtained postmortem on a preclinical 11.7T magnet (collaboration Neurospin, C Poupon). This data has a mesoscopic resolution in the order of 0.1mm.

- *CBP* consists of (1) parcellating the cerebral cortex in anatomical classes, (2) studying the connectivity of each BG voxel with these anatomical classes, and (3) creating clusters of BG voxels based on this connectivity profile.

- *The first dataset was obtained ex vivo from a brain of Macaca fascicularis.* It will allow: (1) to adapt CBP to data having a spatial resolution – and weight – multiplied by 1000 as compared to clinical data: 0.1x0.1x0.1mm versus 1x1x1mm (Months 1-12); (2) to validate CBP results by comparison to a large amount of animal data available in the literature (Month 13-15).

- The second dataset was obtained from a Human Brain donated to Science and scanned on the same MR scanner at the same resolution. These images are unprecedented by the obtained spatial resolution and the method used (total scanning time: 6000 hours). CBP will be used to produce BG morpho-functional maps (Month 16-30). The six remaining months will be dedicated to the thesis redaction.

This thesis will produce a human BG atlas lying on their connectivity to the cortex and the functional networks they are involved in. It will be extensively used in the neuroscience community and in the neurosurgery practice for choosing DBS targets. This work will also produce a BG atlas for a non-human primate (*M fascicularis*) widely used for animal experimentation. Atlases obtained with the same method in two species will facilitate data transfer from monkey to humans.

Application
The selection process will take place in April and May. Please send a cover letter, CV, copy of diplomas, university and final high-school transcripts, and two letters of recommendation to C Destrieux, MD, PhD (destrieux@univ-tours.fr) and I Maldonado, MD, PhD (limamaldonado@univ-tours.fr) before March 30, 2022.