PhD program for which it is intended: Molecular Medicine, Neuroscience and Experimental Neurology

Title of the project: MULTIMODAL MAGNETIC RESONANCE IMAGING DIAGNOSIS OF FRONTOTEMPORAL LOBAR DEGENERATION (FTLD): USING SUPERVISED MACHINE LEARNING TECHNIQUES TO CLASSIFY INDIVIDUAL FTLD AND ALZHEIMER’S DISEASE PATIENTS

http://www.unisr.it/view.asp?id=9408

Description:
Distinguishing between Alzheimer’s disease (AD) and frontotemporal lobar degeneration (FTLD) is important from a clinical point of view, and will become even more so with the emergence of therapies targeted to specific disease mechanisms. For MRI to be useful in the clinical setting, one must be able to make inferences at the level of the individual rather than the group. In this project, we will develop an automated procedure for distinguishing individual FTLD and AD patients based on multimodal MRI. Supervised pattern recognition (SPR) algorithms will be used to classify subjects according to their clinical status using 3D T1-weighted images, diffusion tensor (DT) MRI and resting state (RS) functional MRI (fMRI). For the discrimination between the two disorders, the utility of including clinical, cognitive/behavioral and genetic variables as additional features alongside the imaging data will be examined. SPR algorithm analyses will be also applied to classify subjects according to their clinical and cognitive/behavioral evolution. We expect that a multimodal approach that incorporates volumetric changes, white matter alterations and RS functional abnormalities would provide an optimal classification method that is both sensitive and specific for discriminating FTLD from AD. Our results would indicate that the multimodality classification approach yields statistically significant improvement in accuracy over using each modality independently, and significantly improves the individual patient classification based on clinical and cognitive/behavioural scores.

Key references: