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

Title of the project: Investigation of the functional and structural MRI correlates of motor and cognitive dysfunction in pediatric MS patients.

An estimated 3–10% of multiple sclerosis (MS) patients have an onset of the disease before the age of 18 years. Compared to their adult counterparts, patients with pediatric-onset MS take longer to accrue similar levels of disability although they tend to reach a certain level of disability at a younger age than adult-onset MS patients. Cognitive impairment is a significant component of disability in MS and affects 30-50% of pediatric MS patients. In this project, we will combine multiparametric MRI techniques to define the anatomical and functional substrates of motor and cognitive dysfunction in pediatric MS patients to track their evolution over time and to identify clinical and MRI predictors of long term disease worsening.

To this aims, we wish:
- To evaluate the neurological, neuropsychological and structural MRI characteristics of a large sample of childhood MS patients, with the aim to achieve a better definition of the structural "profile" of this disease group;
- To define the adaptive/maladaptive role of brain reorganization in limiting clinical disability and cognitive impairment in pediatric MS patients and to assess the magnitude of the correlation between the pattern of fMRI activation and resting state functional connectivity and the severity of brain macroscopic and microscopic tissue damage;
- To track the longitudinal modifications of structural and functional MRI measures in pediatric MS patients and their correlation with clinical and neuropsychological measures;
- To identify MR-markers predictive of clinical worsening and cognitive deterioration over the long-term in pediatric MS patients.

This will allow to increase our understanding of the pathophysiology of clinical disability cognitive impairment in patients with pediatric MS, to identify objective MR measures useful for monitoring disease progression and treatment efficacy.

Key references

Link: