Multimodal analysis of neuroimaging and transcriptomic data in genetic fronto-temporal dementia

Résumé du projet de recherche (Langue 1)

Fronto-temporal dementia (FTD) is a neurodegenerative disease with devastating personal, familial and social consequences. A large proportion of FTD cases are due to genetic mutations. The ICM has assembled one of the largest cohorts worldwide on these genetic forms of FTD. Such cohort comprises multimodal data including neuroimaging (MRI, PET), cognition and transcriptomic (RNA-seq). Participants are followed up over time with the different types of data being collected at each visit. A major aim is to use these multimodal data to characterize and discover biomarkers of the presymptomatic phase of the disease, in order to design upcoming therapeutic trials. Analysis of baseline neuroimaging data has led to the discovery of biomarkers with publications in high-impact medical journals [1,2]. The present PhD project aims at designing and applying new approaches for analyzing and integrating multimodal transcriptomic and neuroimaging data. More specifically, the objectives are: i) to analyze the evolution of neuroimaging measures over time; ii) to analyze transcriptomic data both cross-sectionally and longitudinally; iii) to design new approaches for the joint analysis of multimodal transcriptomic and neuroimaging data. We will assess the ability of these approaches to distinguish between presymptomatic carriers of genetic mutations causing FTD (c9orf72 and GRN mutations) and non-carriers, to track the evolution of alterations over time and to predict disease onset. We will also study the relationships between these markers to better understand the presymptomatic phase of the disease.