Internship Proposal
Academic Year 2018-2019

1. **Host team :**

   Research Unit (e.g. Department or Institute) : INSERM Unité 1000 « Neuroimagerie et Psychiatrie »
   Research Unit Director : Jean - Luc Martinot
   Research <u>Team</u> Director : Zille / Paillère
   Team name : Imagerie & Psychiatrie

   Address : INSERM Unité 1000, Maison de Solenn, 97 Bd de Port Royal 75014 Paris

   Supervisor of the Research Intern for this project : Jean - Luc Martinot
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2. Internship project title:

Emotion disorders development in adolescence and brain imaging

3. Internship Description :

Laboratory Website: https://www.inserm-u1000.u-psud.fr/

- By the end of this decade, emotional disorders will be a major cause of disability. In >30% of cases, these disorders begin in adolescence. Early onset of these disorders is a risk factor for mental illness and addiction in adulthood. Therefore, research in adolescents is required to determine the neural basis of these mental disorders. In adolescence, the brain undergoes a critical period of maturation: grey matter volume reduces, white matter volume increases, and connectivity between structures relevant to psychopathology is established. Adolescence is thus understood as a period of both resilience and vulnerability where environmental factors may contribute to a trajectory of neurodevelopmental impairment and to the onset of major emotional disorders.

- This Master's project aims to find links between the psycho-behavioral characteristics of adolescents and young adults and the maturation of their white or grey matter, as explored using high-field magnetic resonance brain imaging.

- The Master topic will be defined to assess the changes in brain networks involved in the regulation of emotions, throughout adolescence. Participants' baseline and follow up data are already available in an exceptional database from a large cohort of european adolescents: measures were prospectively repeated in the same participants to assess their development from age 14 to 20. The nrain imaging techniques used include Magnetic Resonance Imaging (MRI), Diffusion tensor imaging (DTI), and Functional MRI. One brain

imaging modality will be selected with the master student.

The master student will look for longitudinal relationships between brain imaging data and selected psycho-behavioral assessments in healthy adolescents and in adolescents with a diagnostic of mental disorder involving emotional deviation. Clinical and behavioral data include Psychometry questionnaires, and Neuropsychology tests that tap on cognitive and emotional information processing; genetic data are available.

The results obtained in one imaging modality will be compared to the psychometric and behavioral characteristics of the participants, both quantitatively and categorically. Statistical analyzes will be performed to compare subgroups of adolescents, and to establish correlations between the imaging data and the psycho-behavioral variables.

Ultimately, determinations of the predictive values of selected features will be attempted in individuals, using a machine – learning (i.e. artificial intelligence) approach.