

Basic and applied NanoNeuroscience Group

- Summary

Our research program is based on approaches that combined both fundamental and applied neurosciences as well as technology in the fields of neurosurgery. It is attainable by the team composition associating clinicians, neurosurgeons, molecular and cellular biologists. The nano/microtechnologies that represent a recent emergence in medicine will be one of the main thematic frames of our project

The goals of the program is to imagine, develop, and apply new methods or existing methods to the field of pathology of the central nervous system, particularly in brain tumours and also in the field of the diseases strongly connected to the functional neurosurgery.

The tools of the project are accessible in different platforms including clinical and neurosurgical platforms, primate platform, a clinical genomic and proteomic platform, and a brain neurobank.

Two connected fields will be developed in the project, the first concerns neurostimulation and neurosurgery; the second and closely connected one is devoted to clinical poly-omic in neuro-oncology.

Both will benefit of the development of innovative tools for diagnosis and therapy, including:

- (i) Optimization of electrostimulation modalities already validated in Parkinson disease
- (ii) Conception and validation of innovative devices for multiplexed electrostimulation, local micro-delivery and micro-cooling.
- (iii) Clinical validation of the transcriptomic and proteomic tools

The goal will be to progress and extend the indication of deep brain stimulation in neurodegenerative disease, epilepsy and psychiatric disorders, as well as elucidate the mechanism and long-term effect of DBS such as neuroprotection. It will be also to validate biomarkers predicting prognosis and therapeutical response in neuro-oncology. The functional annotation of these biomarkers will be performed to progress in physiopathological understanding but also, after adequate preclinical investigation, in therapeutical applications.