MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2022-2023

(internship from January to June 2023)

Host laboratory:

CarMeN lab (Cardiovascular Metabolism Diabetology Nutrition)
Inserm U1060 Université Claude Bernard Lyon 1
Groupement Hospitalier EST
Bâtiment B13, IHU OPERA
59 boulevard Pinel
69500 BRON -FR

Host team :

IRIS team (Ischemia-reperfusion injury syndromes):
http://carmen.univ-lyon1.fr/equipe-3-ischemia-reperfusion-syndromes/

Internship supervisors :

Marlène Wiart, PhD
*Directrice de recherche CNRS*
marlene.wiart@univ-lyon1.fr

Project title :

Investigating the role of microglial phagocytosis at the acute stage of ischemic stroke in a rat model of thrombectomy

**Project summary :** *approx 10 lines*

Stroke occurs in 155,000 persons in France each year. Ischemic stroke, which results from the occlusion of a cerebral artery, accounts for 80% of all stroke cases. Thrombectomy has recently revolutionized the management of ischemic stroke patients. However, even in case of successful recanalization, more than half of stroke patients suffer long-term neurological sequelae, hence the need for adjuvant treatments. Neuroinflammation is a therapeutic target. Indeed, a neuroinflammatory response is rapidly building up with macrophages as first-line actors, specifically resident microglia. The main function of these phagocytic cells is to clean cellular debris and to ingest apoptotic cells; however, they may also engulf viable neurons thus leading to secondary brain damages (1). The aim of this project is to characterize microglia phagocytosis at the acute stage of ischemic stroke (24h) in a rat model of thrombectomy, as assessed by immunohistology, in brain areas with different ischemia and outcome, as assessed by per-occlusion magnetic resonance imaging (MRI) (Figure).

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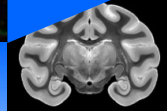
1. Brown GC & Neher JJ (2012) Eaten alive! Cell death by primary phagocytosis: 'phagoptosis'. Trends Biochem Sci 37(8):325-332.
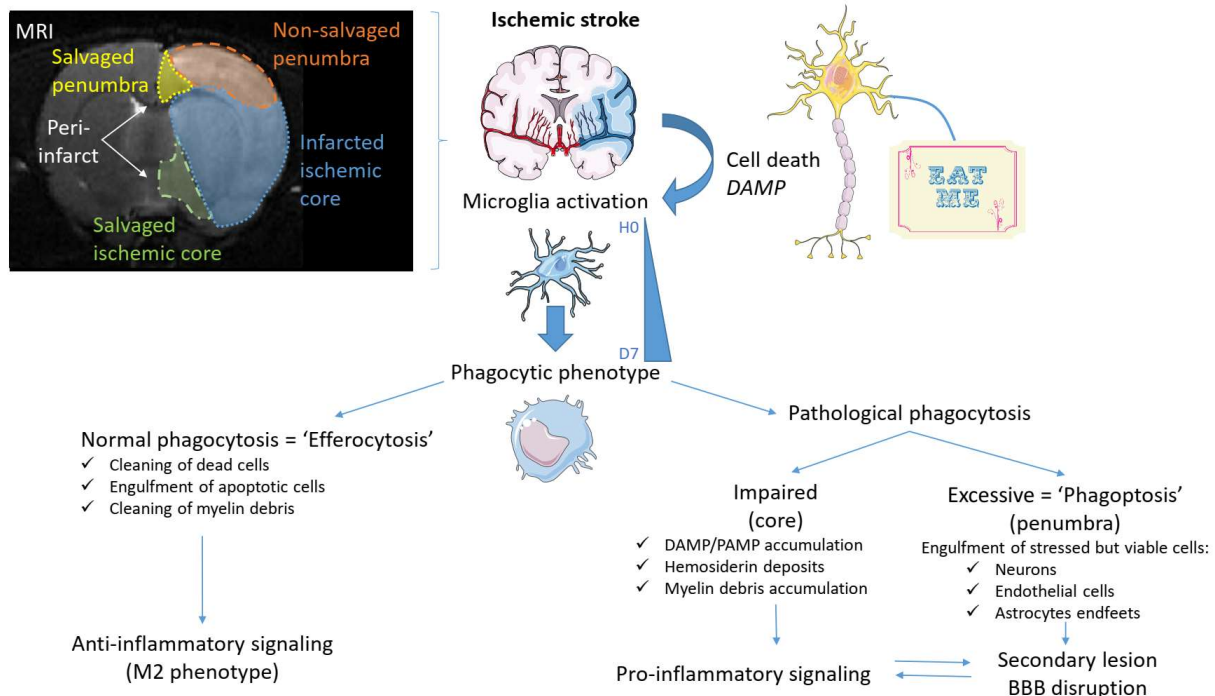
Figure- Project outline

3-5 recent publications :

1. Dumot C, Po C, Capin L, Hubert V, Ong E, Chourrout M, Bolbos R, Amaz C, Auxenfans C, Canet-Soulas E, Rome C, Chauveau F, **Wiart M**. Neurofunctional and neuroimaging readouts for designing a preclinical stem-cell therapy trial in experimental stroke. Sci Rep, 2022, **12**(1): 4700. https://doi.org/10.21203/rs.3.rs-1019878/v1

2. Hubert V, Hristovska I, Karpati S, Benkeder S, Dey A, Dumot C, Amaz C, Chounlamountri N, Watrin C, Comte JC, Chauveau F, Brun E, Marche P, Lerouge F, Parola S, Berthezène Y, Vorup-Jensen T, Pascual O, and **Wiart M**. Multimodal imaging with NanoGd reveals spatiotemporal features of neuroinflammation after experimental stroke. Adv Science 2021, e2101433. https://onlinelibrary.wiley.com/doi/10.1002/advs.202101433

3. Basalay MV*, **Wiart M***, Chauveau F, Dumot C, Leon C, Amaz C, Bolbos R, Cash D, Kim E, Mechtouff L, Cho TH, Nighoghossian N, Davidson SM, Ovize M, Yellon DM. Neuroprotection by remote ischemic conditioning in the setting of acute ischemic stroke: a preclinical two-centre study. Sci Rep 2020 Oct 9;10(1):16874. *co-first authors

4. Cuccione E, Chhour P, Si-Mohamed S, Dumot C, Kim J, Hubert V, Da Silva C, Vandamme M, Chereul E, Balegamire J, Chevalier Y, Berthezene Y, Boussel L, Douek P, Cormode D,

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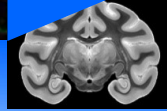
Wiart M. Multicolor spectral photon counting CT monitors and quantifies therapeutic cells and their encapsulating scaffold in a model of brain damage. NanoTheranostics 2020;4(3):129-141.

5. Hubert V, Dumot C, Ong E, Amaz C, Canet-Soulas E, Chauveau F, **Wiart M**. MRI coupled with clinically-applicable iron oxide nanoparticles reveals choroid plexus involvement in a murine model of neuroinflammation. Sci Rep. 2019 Jul 11;9(1):10046
https://www.nature.com/articles/s41598-019-46566-1

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