

Sébastien Rigollet

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Profile

3rd year Ph. D student working on the permeabilization of the blood-brain barrier (BBB) with MRI-guided focused ultrasound (FUS). I'm interested in vascular and physiological modification induced by single or repeated FUS at short and long term. I'm also involved in different therapeutic studies including gene therapy for knock-out mice models and carboplatin delivery to glioma rat model. My thesis is supervised by Emmanuel Barbier (Grenoble Institute of Neurosciences, France) and Chantal Pichon (ART ARNm, Orléans, France), in collaboration with the company Image Guided Therapy (CIFRE stipend).

Education

Ph. D. candidate in physics, GIN, France (November 2021 – now)

Evaluation of secondary bioeffects of focused ultrasound induced blood-brain barrier opening, funded by Image Guided Therapy (Pessac, France) and supervised by Emmanuel Barbier (GIN, Inserm, Grenoble, France) and Chantal Pichon (ART ARNm, Inserm, Orléans, France).

M. Sc. Biomedical Engineering (2018 – 2021)

Phelma, School of engineering in Physics, Applied Physics, Electronics & Materials Science, Grenoble Institute of Technology, France. Graduated in Sept 2021.

Intensive course in physics, mathematics and engineering (2015 – 2018)

Lycée Joffre, Montpellier, France

Experience

Supervision activities

- Master 2 student - Lucas Tachen-Migheli : "In vitro acoustic cavitation evaluation for characterization of therapeutic microbubbles for BBB opening" (February – July 2024) ;
- Master 2 student – Sarra Dbira : "Evaluation of carboplatin biodistribution after FUS induced BBB opening" (February – August 2024) ;
- Bachelor student – Qendresa Arifi : "Histological evaluation of FUS induced BBB opening" (January – June 2023).

Junior scientific council of CDP CerCoG@UGA (January 2023 – now)

Member since January 2023 of the junior scientific board of the cross disciplinary project CerCoG aiming at improving, creating and developing the collaborations between labs of Grenoble among the 3 following axis: Clinical neurosciences, Cognition and Brain. The CDP gathers 18 labs and 595 members. We oversaw the communication around this project by proposing conferences every season of the year (5 in total), interviewing throughout monthly podcasts the young researchers of this community and social network management (LinkedIn, X, Youtube).

Teaching (September – December 2023)

- Plenary about MR-guided FUS for Bachelor and Master 2 students ;
- Tutorials on innovative therapeutic projects for cancer diseases and personal lecture from middle school to bachelor.

Graduation Project – 6 months internship – Grenoble Institute of Neurosciences (February– July 2021)

Working on the implementation and characterization of new MR-guided FUS device for small animal BBB opening in the team Functional neuroimaging and cerebral perfusion team of Emmanuel Barbier. Supervised by Vasile Stupar (Vasile.Stupar@univ-grenoble-alpes.fr).

iGEM competition : PyoBusters project – Phelma, Grenoble Institute of Technology & TIMC-IMAG (December 2019 – February 2021)

Working on antibiotic resistance of *Pseudomonas aeruginosa* bacteria with an engineered *E. coli* and the development of a testing bench device to longitudinally cultivate and analyse bacteria. More about this work: https://2020.igem.org/Team:Grenoble_Alpes.

Skills

- MRI acquisition : pre-clinical 4.7T and 9.4T Bruker scanner, relaxometry, diffusion, perfusion (pCASL), vascular MRI (DCE, USPIO-enhanced), ARFI ;
- MRI processing : quantitative MRI, multiparametric pipeline management, registration, FSL, ANTS, MP3 (in-house MRI processing software) ;
- Coding : Python, Matlab, Labview ;
- Histology : immunofluorescence and H&E staining, image acquisition & processing ;
- Animal Experimentation: level 1 French certification (highest) and surgery ;
- Languages: French, English & Spanish.

Scientific publications

Rigollet, S., Rome, C., Ador, T., Dumont, E., Pichon, C., Delalande, A., Barbier, E. L., Stupar, V., FUS mediated BBB opening leads to transient perfusion decrease and inflammation without acute or chronic brain lesion, 2024, *submitted in Theranostics*

Ador, T., Fournier, M., **Rigollet, S.**, Counil, C., Stupar, V., Barbier E. L., Pichon, C., Delalande, A., Ultrasound-Assisted Blood Brain Barrier Opening Monitoring by Photoacoustic and Fluorescence Imaging Using Indocyanine Green, 2024, *in preparation*

Conference proceedings

Oral presentation

Rigollet, S., Ador, T., Dumont, E., Pichon, C., Barbier, E. L., Delalande, A., Stupar, V., (2024) Longitudinal study tracking physiological changes through multiparametric MRI during repeated MRgFUS-induced BBB opening, In *31st International Society for Magnetic Resonance in Medicine Annual Meeting (ISMRM)*.

Rigollet, S., Delphin, A., Ador, T., Dumont, E., Pichon, C., Barbier, E. L., Delalande, A., Stupar, V., (2024) Longitudinal MR vascular fingerprinting approach tracking physiological changes during repeated MR guided FUS mediated BBB opening on rats., In *23rd European Molecular Imaging Meeting (EMIM)*.

Rigollet, S., Ador, T., Dumont, E., Pichon, C., Delalande, A., Barbier, E. L., Stupar, V., (2023) Cerebral perfusion monitoring after FUS mediated blood-brain barrier opening: a study to evaluate ultrasound bioeffect, In *23rd International Society of Therapeutic Ultrasound (ISTU)*.

Poster session

Rigollet, S., Clément, R., Decressac, M., Barbier, E. L., Delalande, A., Stupar, V., (2023) Optimisation de la barrière hémato-encéphalique contrôlé par IRM sur cerveau entier, In *6^e congrès de la Société Française de Résonance Magnétique en Biologie et Médecine (SFRMBM)*.

Ador, T., Fournie, M., **Rigollet, S.**, Stupar, V., Barbier, E. L., Pichon, C., Delalande, A., (2023) Production and characterization of cationic microbubbles for gene delivery in vivo, In *23rd International Society of Therapeutic Ultrasound (ISTU)*.

Collaborations

- Grenoble Institute of Neurosciences (GIN), France : Dr Michaël Decressac in a project of gene therapy delivery in a mouse model of Leigh syndrome ;
- Laboratory Bioclinical Radiopharmaceutics (LRB), France : Dr Pascale Perret, Dr Alexis Broisat, MD Nicolas De Leiris for nanobody delivery in an Alzheimer disease mouse model ;
- Synchrotron Radiation for Biomedecine (STROBE), France : Dr H el ene Elleaume, Dr Jean-Fran ois Adam for a project around carboplatin delivery combined with radiation therapy in glioma rat model ;
- Laboratoire interdisciplinaire de Physique (LiPhy), France : Dr Bastien Arnal, photoacoustic oxygenation measurements in the brain.