Master project

Optimisation of the process pipeline of cerebrovascular reactivity data for clinical research

Cerebrovascular reactivity (CVR) is the MRI signal response to a CO_2 gas challenge and is used to assess vascular health in patients with cerebrovascular diseases (e.g., Moyamoya, small vessel disease). Data processing and modelling is required after acquisition in order to compute this quantitative map. The aim of this project is to improve the flow of acquiring such maps. This will require optimising the current Matlab/Python code in order to get CVR maps in less than 10 minutes after acquisition. During the project, you will learn about how research is carried out in a hospital and will be working within a team of MR physicists, neuro-scientists and computer-scientists from the CIBM Center for Biomedical Imaging and medical staff from the HUG.
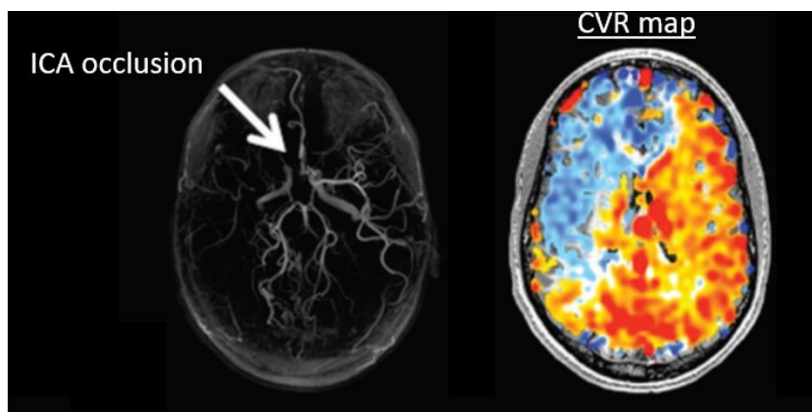
From Han et al., Stroke, 2011; https://doi.org/10.1161/strokeaha.110.603225

References

[1] Han SH, Mikulis DJ, Mardimae A, Kassner A, Poublanc J, Crawley AP, de Veber GA, Fisher JA, Logan WL. Measurement of cerebrovascular reactivity in pediatric patients with cerebral vasculopathy using blood oxygen level-dependent MRI – Stroke 2011, 42(5):1261-9.

[2] Sleight E, Stringer MS, Mitchell I, Murphy M, Marshall I, Wardlaw JM, Thrippleton MJ. Cerebrovascular reactivity measurements using 3T BOLD MRI and a fixed inhaled CO2 gas challenge: Repeatability and impact of processing strategy – Front. Physiol., 2023, Feb 6:14:1070233.

[3] Sleight E, Stringer MS, Marshall I, Wardlaw JM, Thrippleton MJ. Cerebrovascular Reactivity Measurement Using Magnetic Resonance Imaging: A Systematic Review – Front. Physiol., 2023, Feb 25:12:643468.

Supervisor

- **Main Supervisor:** Sébastien Courvoisier, CIBM MRI HUG-UNIGE, [Sébastien Courvoisier - CIBM | Center for Biomedical Imaging](#), sebastien.courvoisier@unige.ch

- **Co-Supervisor:** Emilie Sleight, CIBM MRI EPFL, [Emilie Sleight - CIBM | Center for Biomedical Imaging](#), emilie.sleight@epfl.ch

Skills

Qualifications, previous experience and background:

- Scientific background with basic knowledge of MRI

- Experience with programming languages such as Python or Matlab

- Interest in clinical research.

How to apply: Please send your CV and motivation letter to the main supervisor: sebastien.courvoisier@unige.ch

About CIBM

The CIBM Center for Biomedical Imaging was founded in 2004 and is the result of a major research and teaching initiative of the partners in the Science-Vie-Société (SVS) project between the Ecole Polytechnique Fédérale de Lausanne (EPFL), the Université de Lausanne (UNIL), Université de Genève (UNIGE), the Hôpitaux Universitaires de Genève (HUG) and the Centre Hospitalier Universitaire Vaudois (CHUV), with the generous support from the Fondation Leenaards and Fondation Louis-Jeantet.

CIBM brings together highly qualified, diverse, complementary and multidisciplinary groups of people with common interest in biomedical imaging.

We welcome you in joining the CIBM Community.

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