Identifying overlaps between effective connectivity and seizure propagation in pharmaco-resistant epilepsy: a synergistic use of electrophysiology and tractography

Project summary

In many patients with pharmaco-resistant focal epilepsy, initial seizure freedom can be achieved with the resection of a seizure onset zone (SOZ) defined via neuroimaging and/or intracranial electro-encephalography (iEEG). However, epilepsy often relapses in the follow-up, suggesting broader epileptic networks beyond the SOZ that are complex to delimitate and insufficiently understood. This study combines retrospective data analysis and a prospective case series to characterize these networks and their structural substrates. We aim at comparing patterns of seizure propagation with the effective connectivity near and away from the SOZ. A multimodal workflow will be developed, involving intracranial seizure recordings (iEEG), cortico-cortical evoked potentials and – prospectively – tractography imaging. Applied in a patient-specific manner, this methodology may help tailoring less invasive surgical strategies that optimize seizure freedom and neuropsychological outcomes.

Personal Details

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Positions and Appointments

2015 – 2019	MD-PhD Student, Courtine Laboratory, EPFL-Unil, Lausanne
2019	MD-PhD Title, EPFL-Unil, Lausanne
2020 – 2023	Resident, Neurosurgery department, Inselspital, Bern
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Research focus and collaborations

2015 – 2018	MD-PhD Fellow in spinal cord repair, Swiss National Science Foundation SNSF (CHF 180’000)
2015 – 2019	“Circuits reorganization after complete spinal cord injury”, EPFL-Unil, Lausanne; collaborations with Harvard, Boston, Massachusetts and UCLA, Los Angeles, California
2020 – 2023	“Probabilistic mapping applied to deep brain stimulation for movement disorders and pain”, Functional Neurosurgery Unit, Inselspital, Bern2020 – ongoing “Imaging, recording and computational modeling of seizure propagation”, Functional Neurosurgery Unit, Inselspital, Bern and Sleep-Wake-Epilepsy-Center, Inselspital, Bern