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PhD Thesis in cellular neurobiology and epilepsy

Project Title: Arousal and respiratory co-dysfunction in drug-resistant epilepsy: From mechanisms to therapy

Host laboratory: Lyon's Neurosciences Research Center

Host team : Translational Group in Epilepsy Research (TIGER)

- *PhD supervisor :*

Pr Sylvain RHEIMS, team co-leader and Professor of Neurology at Lyon 1 University and Hospices Civils de Lyon. Sylvain.rheims@univ-lyon.1.fr

- *Other team members involved in the project*

Dr Laurent BEZIN, CNRS Research Director

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Dr Jonathon SMITH, post-doc.

Project summary :



This PhD thesis is integrated within the framework of the ERANET-NEURON funded project AUTONOMIC and of the ERC funded project EPIAROUSAL

Both seizures and their complications are modulated by patients' vigilance states. Several epilepsy complications are associated with sleep, including Sudden and Unexpected Death in Epilepsy (SUDEP). SUDEP primarily results from a fatal postictal central apnea after a nocturnal generalized convulsive seizures. Reducing the severity of postictal respiratory dysfunction has thus appeared as one of the most promising ways to prevent SUDEP. However, no encouraging result has been reported yet, suggesting that epilepsy-related respiratory dysfunction may only be the tip of the iceberg. Given the numerous interconnections between the network that regulates arousal and sleep and the respiratory network, one might make the hypothesis that some patients with drug-resistant epilepsy might combine this well-known seizure-related respiratory dysfunction with a chronic alteration of arousal regulation, resulting in abnormal asphyxia-induced arousal. **The PhD project will thus study the interplay between epilepsy-related respiratory dysfunction and arousal regulation.**

The project will be conducted in two rodent models of epilepsy: (i) Scn1a^{RH/+} mice, a mouse model of Dravet Syndrome, a severe neurodevelopmental disease, characterized by infancy onset, severe cognitive deficit and drug-resistant seizures, and high risk of seizure-related death; (ii) rat model of temporal lobe epilepsy (TLE). **The work will use complementary techniques, including long-term cardio-respiratory recordings combined with EEG, *in vivo* multiunit recordings as well as molecular neurobiology (RT-qPCR and RNAscope).**

Administrative organization

- Doctoral school : Neurosciences and Cognition (ED476): <https://nsco.universite-lyon.fr/site-francais/>

- Funder and Employer : Lyon 1 University. 3-year contract. Salary : 1687 € / month



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