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Summer Undergraduate Research (SUR) Programme 2024

Project title:
Neuroanatomic description of POMC neuronal projections in mice

Intro:
Energy and glucose metabolism are centrally controlled by the brain, notably by hypothalamic neurons expressing the pro-opiomelanocortin (POMC). Surprisingly, despite decades of research on the functional role of POMC neurocircuits in mice, the exhaustive POMC neuronal network has never been exhaustively described in this species. In addition, these neurons are found in two specific hypothalamic areas called the arcuate nucleus (ARH) and the retrochiasmatic area (RCH), but whether POMC neurons display specific projection pattern depending on the location of POMC cell bodies is not known.

Aims of the project:
Here, the student will participate to the exhaustive mapping of POMC neuronal projections.

Experimental approaches:
To label POMC neuronal projections, transgenic mouse line expressing the Cre recombinase under the control of POMC promoter (Pomc-Cre) will be used. These mice will receive a stereotaxic injection of a cre-dependent virus allowing the expression of fluorescent mcherry protein in POMC cells bodies either found in the RCH or the ARH, and thus in their respective projections. After diffusion of the virus and sacrifice of the mice, brains and spinal cord will be collected. The master student will be asked to sectioned the brains with a slicer microtome, and to perform enzymatic immunohistochemistry to permanently label POMC neurons and their projections. Images will be acquired and one specific area of projection will be analyzed for illustration.

Significance:
This project will provide an exhaustive description of POMC neuronal projections, indispensable for a better understanding of POMC-related functions.