# Neurobiology of the gut-brain axis

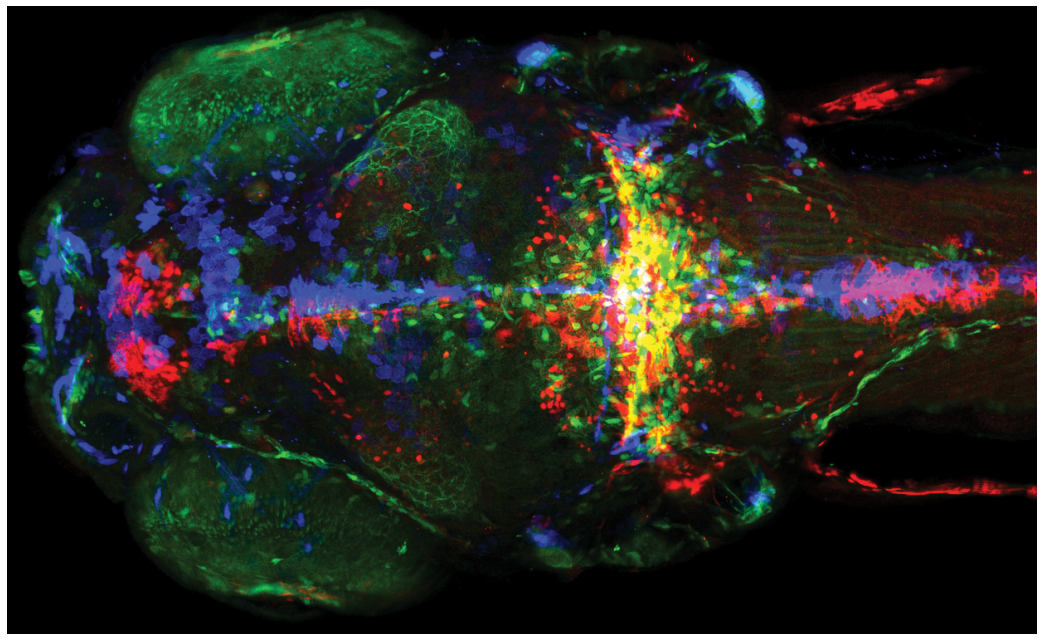
Gilles Vanwalleghem
**gilles.vanwalleghem@mbg.au.dk**

## Background

We use a transparent animal model, the larval zebrafish, to understand *in vivo* processes along the gut-brain axis.

We want to understand how the nervous system senses and regulates the bacteria in the gut. We are also interested in neuroimmunity at large.

Our projects involve molecular biology, live imaging, and image/data analysis.



## Project 1: Gut-brain axis

? How does the gut microbiome affect the development of an animal?

How strongly can it change behaviour?

How is gut physiology controlled by the nervous system?

How is Autism spectrum disorder affected by the gut?

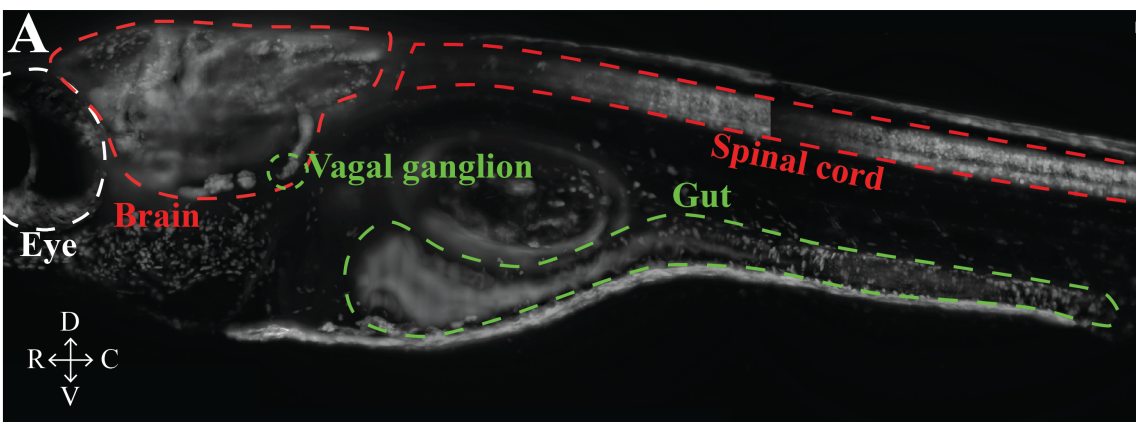
This project will involve live imaging, bacterial culture, behavioural studies and data analysis

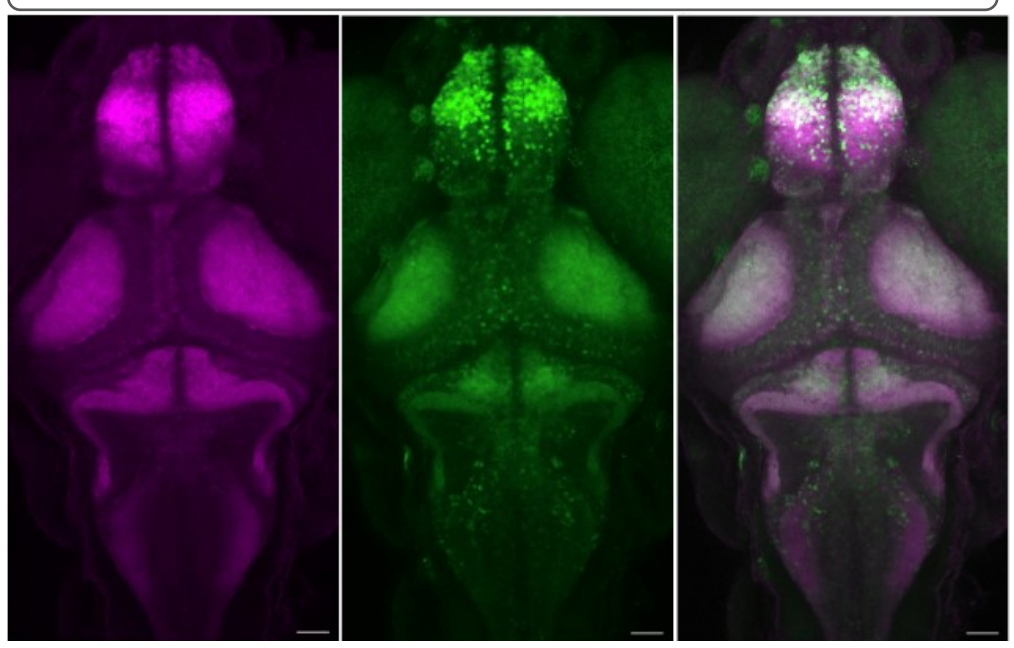
## Project 2: Neuroimmunity

? How do the immune and nervous systems interact?

The brain constantly monitors bodily signals through interoception, and while immune neuronal memory has recently been described, the neuronal circuits are unknown.

We can image the whole zebrafish brain to identify neurons that respond to inflammatory changes.



Brain stained for total ERK (magenta) brain stained for phosphorylated ERK. (green) merged total ERK- and phosphorylated ERK-immunostained brains (right). Scale bars=100µm

## Recent publications

[1] "Brain-wide visual habituation networks in wild type and fmr1 zebrafish." *Nature Communications*, doi:10.1038/s41467-022-28299-4

[2] "Brain-wide mapping of water flow perception in zebrafish." *Journal of Neuroscience*, doi: 10.1523/JNEUROSCI.0049-20.2020