

Department: Cognitive Neuroscience

Group: Translational Psychiatry

Supervisor: Sabine van Heukelum

Scientific background

Aggressive behaviour is part of the repertoire for evolutionary success. However, if not proportional to the environmental context, aggression can quickly lose its adaptive function. Aggression is therefore subject to strong inhibitory mechanisms, mainly mediated by anterior and midcingulate cortex (ACC/MCC). Failed inhibition of aggressive behaviour is seen in several neurodevelopmental disorders such as conduct disorder and autism spectrum disorder. These patient populations show abnormalities in ACC/MCC anatomy and function, suggesting a causal role for ACC/MCC in the regulation of aggression.

Project background

We have previously demonstrated changes in the cytoarchitecture and activity levels of ACC and MCC in aggressive BALB/cJ mice, a mouse model known for increased aggressive and autism-like behaviour. Our data suggest disruption of neuronal activity of ACC and MCC, likely resulting in failed top-down inhibition of aggression circuitry (van Heukelum et al., 2018 [Brain Structure & Function]).

In this project we want to further investigate activation patterns of ACC and MCC in aggression. To do so, we will combine innovative two-photon calcium imaging with a behavioural task probing aggression. In a second step, using chemogenetics, a technique based on chemically engineered molecules and ligands, we will manipulate activity within ACC/MCC to rescue the aggressive phenotype of BALB/cJ mice.

What will you do

Under the supervision of the PhD candidate S. van Heukelum (and partly postdoctoral researcher [Dr. M. Havenith and/or Dr. A. França]) you will make use of the following techniques:

- Animal behaviour testing & analysis
- Immunohistochemistry
- Fluorescence microscopy
- Depending on the start of the internship:
 - o In-vivo two-photon calcium imaging OR
 - o Chemogenetics (DREADDs)

What we expect from you:

Highly motivated and enthusiastic master students (Neuroscience, Biomedical Sciences, Medical Biology, Molecular Life Sciences or similar), **with experience in animal work and article 9 certificate OR willing to acquire the article 9 certificate before the start of the internship**, for a period of 9 months or more. If you are interested, please send an e-mail with motivation and CV to Sabrina van Heukelum (Sabrina.vanHeukelum@radboudumc.nl).

