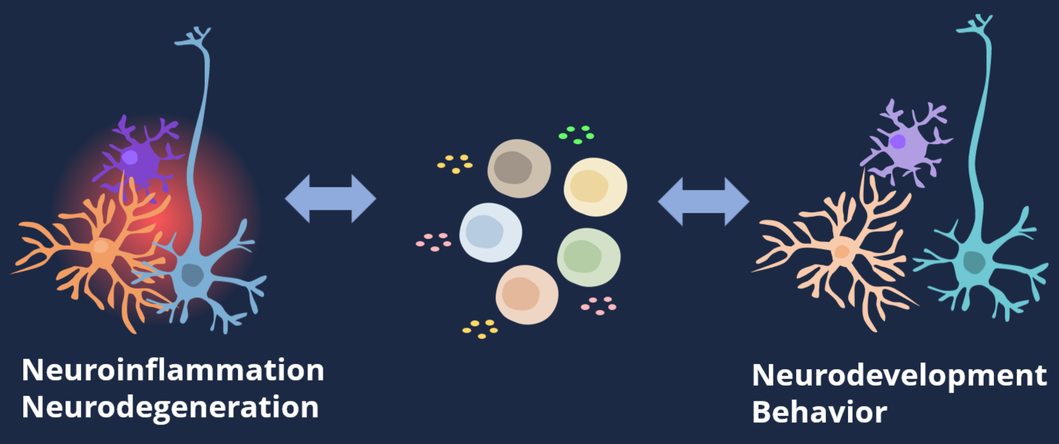
Neuroimmunology lab

VIB-UAntwerp Center for Molecular Neurology

Exploring T cells in the CNS: from health to disease

We study the complex interactions between the immune and nervous systems. This is a rapidly advancing field in science that is discovering the immune system's role in brain health and diseases. We now understand that immune-related processes are involved in conditions that were previously thought to be purely neurological disorders. Gaining a deeper understanding of how the immune system and the brain interact will revolutionize our understanding of brain biology and diseases.



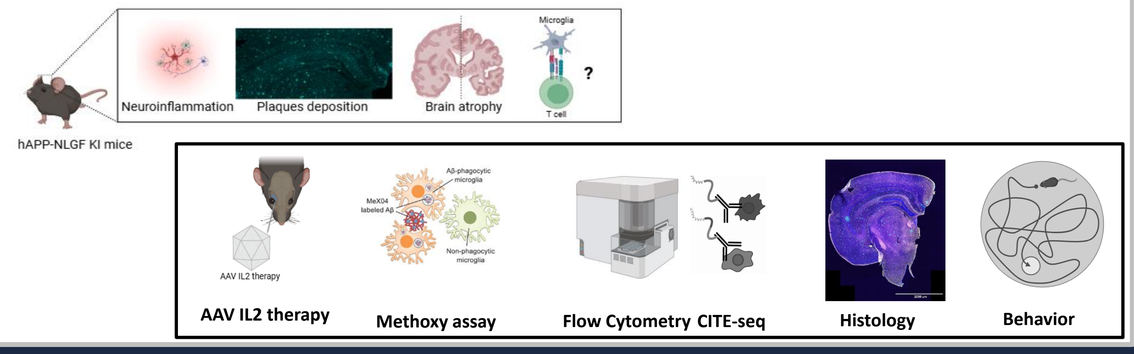
Our aim is to gain mechanistic insights into how T cells influence brain plasticity and diseases and to pinpoint molecular targets for innovative therapeutics. We have devised a comprehensive research pipeline that commences with in-depth immunological profiling for the identification of novel immunological pathways. This is followed by rigorous functional validation to assess the role of the identified circuits. We will employ genetic models and AAV-based gene therapy to target specific pathways, administer biologics, or modulate the presence of beneficial immune infiltrates in the brain.

T cells in Alzheimer disease

Hypothesis: **The crosstalk between the adaptative immune system and microglia contributes to Alzheimer disease pathogenesis.**

→ What role do microglia play in the recruitment of immune cells during amyloid-associated neuroinflammation?

→ What is the contribution of MHC-II to the microglial response to Aβ amyloid?



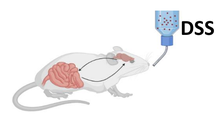
Gut-brain crosstalk in IBD

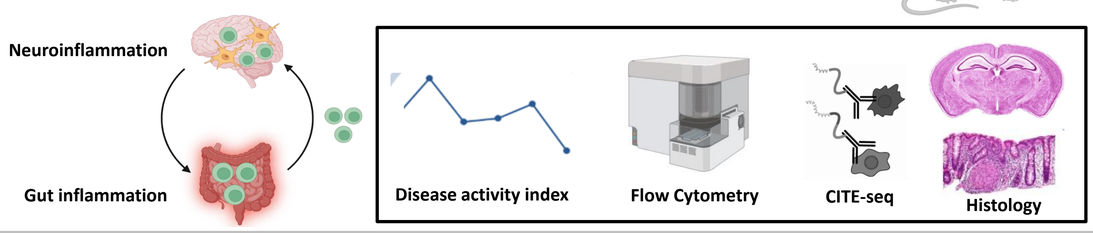
Hypothesis: **Gut inflammation shapes the immune landscape of the brain and contributes to neuroinflammation.**

→ Are immune cells able to migrate from the gut to the brain during gut inflammation?

→ Are brain immune cells contributing to neuroinflammation during gut inflammation?

→ Can CNS-specific immunotherapy offer therapeutic relief?



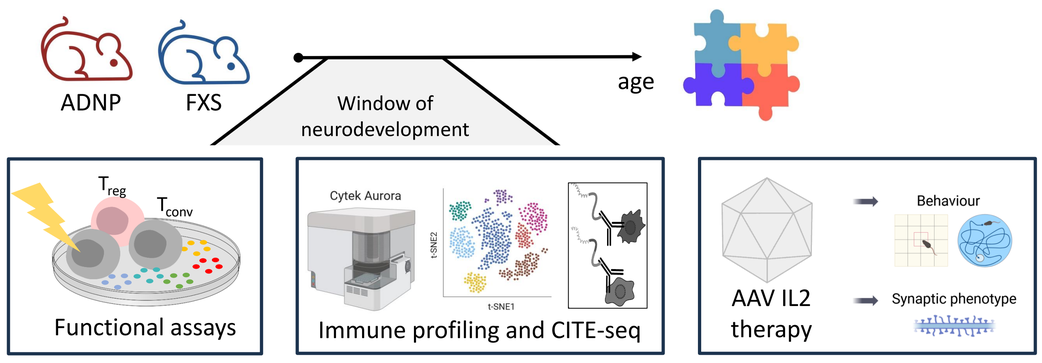


T cells and neurodevelopment in autism

Hypothesis: **Defective function of regulatory T cells exacerbate autism.**

→ Is there a causal link between (regulatory) T cell dysfunction and autism?

→ Can regulatory T cell-modulating biologics ameliorate autism symptoms?

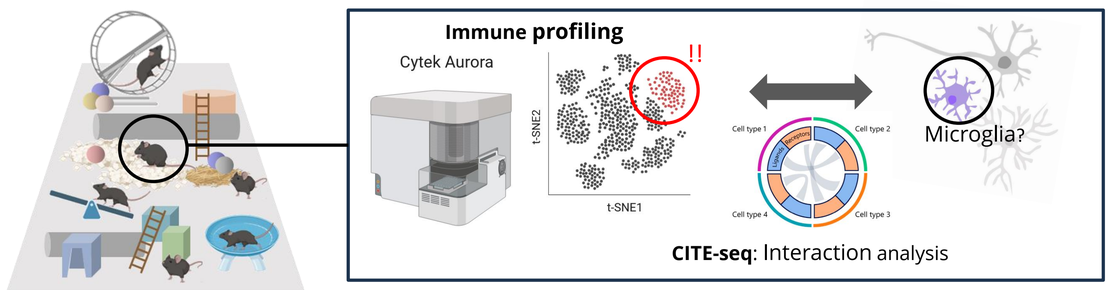


Immune mechanisms of brain plasticity

Hypothesis: **Environment-induced changes in the CNS immune landscape support brain plasticity.**

→ Which immune cells are essential for brain plasticity?

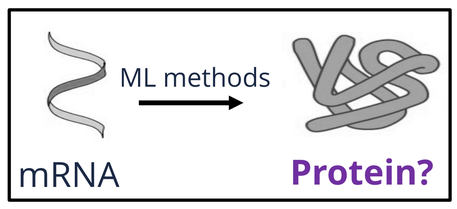
→ What are the immune pathways that support environment-induced brain plasticity?



Research tool development

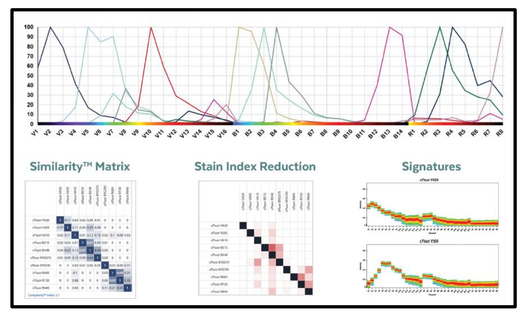
Protein expression from RNA

In collaboration with the Computational Neurobiology Lab (VIB-UAntwerp), we are developing a tool, based on machine learning methods, that uses CITE-seq data to infer protein expression based on RNA expression.



Spectral flow panel design

→ Immune landscape
→ Cytokine production
→ Microglia profiling
→ Human PBMC



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