



Master/Bachelor thesis immunometabolism – Short chain fatty acids as potential immunometabolites



Who are we?

The immuno-metabolism group (head: Prof. Karsten Hiller), located at the Braunschweig Integrated Centre of Systemsbiology (BRICS), investigates cellular and mitochondrial metabolism of immune cells during bacterial infection, cancer, metabolic complications and neuro-degeneration. The team has developed a strong expertise in stable-isotope assisted metabolomics and metabolic flux analysis both on a whole cell as well as on a mitochondrial sub-compartment level.

Project background

Macrophages are key components of the innate immune system, playing pivotal roles in both initiating and resolving inflammatory processes. These functions rely on tightly regulated mechanisms that are closely linked to extensive metabolic reprogramming. Such metabolic changes not only support the heightened energy demands associated with immune functions but also serve regulatory purposes. Specific metabolites, known as immunometabolites, can accumulate within immune cells or be secreted by neighboring cells, directly influencing immune cell responses.

Thesis content

Short-chain fatty acids (SCFAs), primarily produced by fermentative gut bacteria, play crucial roles in maintaining host health. They modulate immune responses by attenuating inflammation, enhancing the colonic defense barrier, and reducing oxidative stress. Our research focuses on unraveling the role of SCFAs in macrophage metabolism, with the goal of identifying novel immunometabolites that influence immune function.

Methodology:

- cell culture
- Metabolomics, GC-MS
- stable isotope tracing
- qPCR
- ELISA

Interested?

Students with strong interests in immunology and metabolism are encouraged to apply.

We offer:

Bachelor and Master

English or german

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