



Macrophage metabolism in different inflammatory settings



Who are we?

The immuno-metabolism group (head: Prof. Karsten Hiller), located at the Braunschweig Integrated Centre of Systems Biology (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 sentinel cells of the innate immune system that populate tissues of the body, where they scan their surroundings for invading pathogens such as bacteria, viruses or fungi. Upon pathogen encounter macrophages initiate an inflammatory response to recruit other immune cells and ultimately eliminate the pathogen. These processes are tightly regulated as insufficient immune activation leads to increased susceptibility to infections, whereas overshooting inflammation may lead to tissue damage and autoimmunity. Current anti-inflammatory treatments such as corticosteroids predominantly globally dampen inflammation, which may have serious undesired effects. It is well known that macrophages adopt their metabolism in the context of certain bacterial infections to support their anti-bacterial immunity. Targeting distinct elements of macrophage metabolism holds great potential for targeted vaccine adjuvant development to treat inflammatory diseases. Aim of this project is to identify whether and if so how macrophages also employ their metabolism to specifically fight other infectious agents. Ultimate goal is to identify specific signatures and metabolic vulnerabilities for different infections.

Thesis content

You will work with human immune cells, which you will isolate from blood donations and cultivate to yield macrophages. These macrophages will be activated with different inflammatory stimuli that mimic infection with different types of bacteria, viruses and fungi.

To assess changes in metabolism macrophages will be comprehensively analyzed using mass spectrometry (LC-MS, GC-MS), stable isotope assisted metabolomics, respirometry and extracellular flux analysis,

Interested?

Please send your application via Email with your preferred starting date.

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