Title: Identifying unique metabolic adaptation of red pulp macrophages to iron deficiency (NCN/SONATA BIS).

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Laboratory: Laboratory of Iron Homeostasis
www: https://shorturl.at/tGX2E

Project description:

Iron recycling provides the primary source of iron for all cells in the body, including for the daily production of ~200 billion erythrocytes. This process is primarily carried out by splenic red pulp macrophages (RPMs), which engulf senescent erythrocytes through erythrophagocytosis, degrade them within phagolysosomes, and release iron to replenish the plasma iron pool. Despite the central role of RPMs in iron recycling, limited knowledge exists about these cells and the regulatory mechanisms governing their erythrocyte clearance capacity. We uncovered that iron deficiency, a global health burden with profound socio-medical impacts, intensifies the phagocytic capacity of RPMs toward erythrocytes. We identified a unique metabolic rewiring in these specialized cells, distinct from any observed in other cell types, which drives their heightened phagocytic activity. Additionally, we uncovered specific signaling pathways that regulate these metabolic adaptations. In sum, this project identifies new links between specific metabolic pathways and the regulation of iron homeostasis at the level of erythrocyte recycling.

Aim:

Within this project, we will apply both in vivo and in vitro approaches to further decipher the role of newly identified metabolic adjustments, particularly in amino acid utilization and catabolism, in the modulation of RPM phagocytic activity. We will also explore whether these metabolism-driven regulatory mechanisms extend to the control of efferocytosis, the general process of apoptotic cell clearance. This work is expected to advance our understanding of, and specialization in, the metabolic control of efferocytosis.

Requirements:

- Holds a Master's degree in biology, biochemistry or related field
- Eligibility for PhD studies in Poland
- Interests in molecular aspects of physiology, motivation for experimental work, passion for science, hands-on experience in laboratory work
- Experience in mouse/rat-based studies or willingness to work with animals
- Written and spoken fluency in English
- Willingness to learn and take on new challenges, ability to work independently, analytical thinking
- Good interpersonal skills and a collaborative attitude
- Research achievements (eg, publications or manuscripts in preparation) and experience abroad will be of advantage

Number of positions available: 1

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