

Doctoral study program: Biomedical Sciences

Form: *doctoral (present/combined)*

Department: Cellular and Molecular Immunoregulation group, Center of Translational Medicine, ICRC, FNUSA and LF MUNI

Supervisor: Mgr. Marcela Hortová Kohoutková, Ph.D.

Consultant: Mgr. Jan Frič, Ph.D, MHA

Ph.D. topic: Molecular mechanisms of sepsis-induced immunosuppression: therapeutic targets for restoring immunity.

Annotation (max 200 words):

Septic shock is a life-threatening condition characterized by dysregulated immune response. Changes in innate immunity, including aberrant monocyte activation, are the major aspect of both acute and recovery phase of sepsis. Interleukin-10 (IL-10), a key immunosuppressive cytokine, plays a crucial role in modulation immune homeostasis by attenuating excessive inflammation and promoting immune tolerance. However, its precise impact on monocyte function and innate immune regulation in the context of sepsis remains incompletely unresolved.

This project aims to elucidate the role of IL-10 in the regulation of monocyte activation followed by the development of immunosuppression phenotype during the onset of septic shock and later recovery. Using clinical samples from septic patients and preclinical models of 3D iPSCs derived bone marrow organoids, the project will address the dynamic interplay between IL-10 levels, monocyte phenotypes, and the expression of inflammatory mediators. Key objectives include characterizing IL-10-dependent signaling pathways in monocytes, identifying molecular mechanisms underlying immune suppression, and exploring IL-10's potential therapeutic implications in modulating innate immunity. Insights from this work could pave the way for novel immunomodulatory strategies to improve outcomes in sepsis and septic shock.

Funding: Horizon Europe - BEATsep

Information on funding PGS positions:

The program requires that all PhD students have some means of financial support of min. 25 000 CZK per month. This is often a combination of various sources (grants, scholarship etc.)

Requirements for the student according to the Doctoral Board:

The student's minimum publication activity within the course of study is one first-author publication with an IF value above the median in the field or 2 first-author publications in journals with an IF value in the 3rd quartile in the field (Q3). A condition for successful completion of the studies is also a foreign internship of at least 1 month, which is an inseparable part of the studies. As part of their studies, students will also participate in the teaching.

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