PhD project No. 7, Prof. Henneke

Scientific Area	Haematopoiesis and immune cell differentiation
Two project titles	A) Macrophage adaptation to barrier tissue niches in chronic infection B) Differentiation of nerve-and vessel-associated tissue macrophages
Host country	Germany
Supervisor, institution	Philipp Henneke, Medical Center - University of Freiburg, Germany
Co-Supervisor, institution	Vincent Flacher
Mentor, institution	to be determined later
Secondment institution	A) and B) xxx

Short description of the supervisor's lab with introduction to the topic

The Henneke lab studies the development and environmental adaptation of barrier tissue macrophages starting at the beginning of life. Key questions: Are microanatomical niches imprinting differentiation programs on macrophages? How do origin and self-renewal impact on these processes? How does niche-driven macrophage adaptation impact on antimicrobial tissue defense and on tissue repair?

Topic description, including techniques to be used

Project A)

We plan to analyse the adaptation of macrophages to distinct microanatomical niches in barrier tissues in disseminated chronic bacterial infections with mycobacteria and *Staphylococcus aureus*. We will focus on sites of infection in the bone-marrow, education of macrophage progenitors for localisation to target tissues, and induction of tissue and cell subset-specific immune memory.

Techniques: Fate-mapping mouse lines, models of chronic bacterial infection, high-resolution and in-vivo-imaging, FACS immunophenotyping, low-input to single-cell transcriptomics and epigenetics.

Project B)

We plan to characterize nerve-and vessel-associated macrophages from diverse tissues for preconditions of adaptation to their distinct target structure. These studies will be complemented by ex vivo models of intercellular adaptation.

Techniques: as above *plus* induced pluripotent stem cell-derived macrophages including genetic engineering and models of synthetic skin, skin transplantation.

Recommended applicant's training (technical expertise and knowledge)

Techniques: Animal handling, FACS, flow cytometry, SDS-PAGE, Western blotting
Knowledge: Infection immunology, microbiology, cell biology

Maximum two relevant publications

Kolter J et al., 2019, Immunity: A subset of skin macrophages contributes to the surveillance and regeneration of local nerves.
Lösslein A et al., 2021, Nature Communications: Monocyte progenitors give rise to multinucleated giant cells.

The EURIdoc programme has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement number 101034170.

Ethics description

1. Humans	
This research involves human participants.	YES ☐ / NO ☒
This research involves physical interventions on the study participants.	YES ☐ / NO ☒
2. Human Cells /Tissues	
This research involves human cells or tissues, such as blood.	YES ☒ / NO ☐
3. Personal Data	
This research involves personal data collection and/or processing.	YES ☐ / NO ☒
This research involves further processing of previously collected personal data (secondary use).	YES ☐ / NO ☒
4. Animals	
This research involves animals, such as mice.	YES ☐ / NO ☒

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