HELMHOLTZ MUNICH

Helmholtz Zentrum München Deutsches Forschungszentrum für
Gesundheit und Umwelt (GmbH), Heidemannstraße 1, 80939 München

To all interested **master's students** looking for a

Research internship and/or Master Thesis in
Immunological Diabetes Research at the
Research Unit for Type 1 Diabetes Immunology
Helmholtz Diabetes Center
Helmholtz Center Munich

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February 2024

The **German Research Center for Environmental Health, Helmholtz Zentrum München** pursues the goal of developing personalized medical approaches for the prevention and therapy of major common diseases such as diabetes mellitus, lung diseases, and allergies. Therefore, it investigates the interaction of genetics, environmental factors, and lifestyle. The research unit for Type 1 Diabetes Immunology (TDI) is part of the Helmholtz Diabetes Center (HDC) and **located in the North of Munich**. Our main interests are the cellular mediators of immune tolerance – so-called Foxp3$^+$ regulatory T (Treg) cells. Lack or functional deficiencies of Treg cells results in autoimmunity as observed in Type 1 Diabetes. In contrast, exaggerated Treg cell responses may impair productive immune responses against neo-autoantigens in tumor settings or against foreign antigens in host defense. Therefore, novel compounds that dampen excessive Treg cell responses – so-called Treg reducers – are of therapeutic interest for Treg-based immune protection of tumors. To answer our research questions, we focus on respective mouse models and are particularly interested in T cell populations including Tregs isolated from various lymphoid and non-lymphoid tissues. Our different mouse models include diabetes models, gain- and loss-of-function models, and innovative humanized mice to bridge the translational gap between mouse models and human diseases.

Possible Project for a Research Internship and/or Master Thesis

Characterization of novel compounds as potential Treg reducers

In a high-throughput screening approach we identified compound candidates that affect the antigen-specific Treg induction capacity of naïve T cells *in vitro*. A subset of these compounds will be validated in more detail to examine their effect on the differentiation of naïve T cells in steady state and under challenging conditions. Furthermore, the compounds will be characterized by their toxicity, their metabolic effect on T cell subsets and their effect on Treg suppressive capacity. These analyses will enable subsequent target identification, structural optimization, and *in vivo* application of the identified compounds. Overall, this project provides important insights into the therapeutic potential of these novel compounds in the context of cancer.

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General methods depend on the project progress but usually include:

- Multi parameter flow cytometry and cell sorting (FACS)
- T cell differentiation assays *in vitro*
- ELISA for autoantibody detection in murine NOD plasma
- mRNA expression analysis from tissue and/or sorted cells by real-time qPCR
- Toxicity assessment of compounds by using Cell Painting technology
- Metabolic effect on T cells by using Seahorse XF assay technology

Your qualifications:

- Highly motivated with a profound scientific interest
- Initiative and problem-solving abilities for complex scientific questions
- Willingness to work with laboratory mice is essential (experience not required but beneficial)
- Background knowledge in Immunology is beneficial
- Good communication and presentation skills in English

Our offer:

- Positive working atmosphere in a young and highly motivated scientific environment
- State-of-the-art technologies
- Training to work with laboratory animals (for master students)
- Direct and interactive supervision
- Weekly meeting with scientific discussion for a broad overview of current immunological questions, research in progress updates and weekly 1:1 meetings to discuss the project

For further information, please contact Till Johannsmann or Maike Becker directly.
Please send inquiries with your short motivation letter, a detailed CV (focus on previous lab and method experience) and the latest transcript of records combined in a single PDF via Email to

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