Dr. med. Sebastian Schramm & Dr. rer. nat. Tanja Müller

Engineered *ex vivo* expanded regulatory T cells for autologous adoptive transfer therapy of ulcerative colitis

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Junior Clinician Scientist
nTTP-GCT-Cohort 2025

Department of Medicine 1
UNIVERSITÄTSKLINIKUM ERLANGEN

Fields of Research:

- Immune-Mediated Inflammatory Diseases (IMID) of the gastrointestinal tract
- Immunology/immunotherapy for chronic inflammatory bowel diseases
- Gastrointestinal microbiome
- Diagnostic and treatment of portal hypertension
- Interventional endosonography

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Translational Scientist
nTTP-GCT-Cohort 2025

Translational Research Center (TRC)
Department of Medicine 1
UNIVERSITÄTSKLINIKUM ERLANGEN

Fields of Research:

- Immunology
- Chronic inflammatory bowel diseases
- *Ex vivo* expansion of regulatory T cells
- Colorectal cancer

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Project Description:

Chronic inflammatory bowel diseases (IBD), such as Crohn's disease and ulcerative colitis, are characterized by a strong infiltration of T cells into the intestinal mucosa, leading to an imbalance between pro- and anti-inflammatory T cells. Most current treatment strategies are designed to restrain the signalling or recruitment of pro-inflammatory T cells, but fail to achieve ensure long-term remission in many cases.

An innovative and personalized therapeutic approach involves the use of regulatory T cells (Tregs) to specifically promote anti-inflammatory mechanisms in the intestinal tissue. At the University Hospital Erlangen, a GMP-compliant protocol for the *ex vivo* expansion of autologous Tregs (IMP-Tregs) for adoptive cell therapy has already been developed, and a Phase I dose-finding study in patients with ulcerative colitis has been successfully completed. However, the central hypothesis of our project is that the therapeutic efficacy of IMP-Tregs can be further optimized by improving their gut-homing and/or suppressive functions.

Therefore, our project pursues three main objectives:

1. A detailed characterization of IMP-Tregs using scRNA sequencing, focusing on cells that have already been modified to enhance their migration into inflamed intestinal tissue.
2. Further development of IMP-Tregs through targeted genetic modification/mRNA electroporation to further enhance their migration into the gut and their suppressive functions.
3. Preparation of a clinical trial with modified IMP-Tregs.

The findings from our project could lead to a promising new treatment option for patients with IBD.

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