ZIBI Graduate School

Project description

Project Title: *Giardia duodenalis*: cognate interaction with distinct differentiated cell types of human duodenal epithelia

Research Group: RKI Unit 16: Mycotic and Parasitic Agents and Mycobacteria
Institute of clinical physiology, Charite Campus Benjamin Franklin
Address: Robert Koch-Institute
Seestraße 10
13353 Berlin

Supervisors: T. Aebischer, J. Schulzke, Christian Klotz

Project Description:

Giardia duodenalis is a protozoan parasite and causative agent of one of the most common diarrheal diseases worldwide but is also present in carriers that do not become ill and show no symptoms. The reasons for these two very different outcomes of infection are unclear. This project aims at investigating the parasite host tissue interaction at a mechanistic level using a novel in vitro model namely that of human intestinal organoids.
This model now enables the study of the interaction of *G. duodenalis* with the cognate host cells of its very habitat, human duodenal epithelial cells. Human organoids and organoid-derived cell cultures will be used to investigate the response to the parasite and the diverse host cells at a time. A particular focus will be on the interaction with Tuft cells (also known as Brush cells) which were recently described as a critical source of the cytokines that trigger the highly skewed Type 2 immune response in nematode and protozoan infections in mice.

Benefitting from an existing collection of *G. duodenalis* isolates comparative analyses using genetically distinct parasites shall be performed. Intially, interactions will be characterized based on a transcriptomic analysis and cause effect relationships will subsequently be assessed in vitro using pharmacologic intervention and genetic engineering.

The project is particularly suited for students that like to develop and hone their skills in advanced cell culture, molecular biology, electrophysiology and advanced microscopy. Since transcriptomics will also be used e.g. for profiling the host as well as the parasite reaction to mutual contact, an interest and ease in dealing with high dimensional data sets using basic bioinformatics will be helpful. Successful candidates will primarily work and be integrated in the Giardia-research team at the RKI but shall be equally interacting with the mirror team at Charite University hospital Benjamin Franklin.