SFB Guest Lecture Series

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Investigation of gastrointestinal cell types using organoid cultures and by single-cell RNA-sequencing

The Busslinger lab is interested in the epithelial cell biology of the human gastrointestinal tract (GI). Highly specialized epithelial cell layers line every GI organ. They are responsible for executing and regulating the majority of organ-specific processes. While epithelial cells are constantly renewed by tissue-resident adult stem cells, any disruption of the homeostatic equilibrium, leading to either malfunctioning cells or even their loss, is associated with a variety of diseases such as inflammatory diseases and cancer.

In the lab, we use human organoid cultures as a model system to study adult stem cell differentiation behavior *in vitro*. We genetically modify them using different CRISPR-Cas9 genome editing approaches. Thereby, we identify and molecularly dissect the role of genes such as transcription factors within specialized cells. Additionally, we apply high-throughput sequencing approaches such as bulk and single-cell RNA-seq to gain insights into gene expression dynamics and individual cell states. Of particular interest are also fresh human tissue samples, where healthy and disease conditions are compared.

Two projects will be presented: one about the differentiation of gastric mucus secreting cells and a second one about the cellular characterization of macroscopic lesions within ulcerative colitis patients.