

Master Thesis

Helicobacter pylori-associated cancer

signaling

Signaling in Inflammation and Gastric Cancer

AG Microbiology - "Pathogen-induced Signaling and Cancer"

The human pathogen *Helicobacter pylori* is a class-I carcinogen that can induce clinically-relevant disorders like chronic gastritis, ulceration, mucosa-associated tissue (MALT) lymphoma and gastric cancer. In fact, gastric cancer represents one of the most frequent causes of cancer-related deaths worldwide since no effective treatments are available. New knowledge about the *H. pylori*-induced signal transduction pathways is crucially important to understand how *H. pylori* reprograms gastric epithelial cells and drive them into cancer and rapid metastasis:

Available projects:

1. Genomic editing of *H. pylori*-relevant signaling molecules in gastric epithelial cells using novel CRISPR/cas systems:

- Generation lentiviral CRISPR/Cas9 systems suitable for the generation of genomic knock-out and/or point mutations in the gene of interest
- Generation of stable cell lines and investigation of signal transductions pathways in response to *H. pylori* infections

2. Analysis of the *H. pylori*-reorganized actin cytoskeleton:

- How can *H. pylori* transmit the signal from the cell surface to the actin cytoskeleton: transmembrane receptor studies, phosphorylation studies, imaging, etc.
- Investigation of the *H. pylori*-changed epithelial cell morphology and migration: speed, force and direction
- Investigation of the functional consequences of the reorganized actin cytoskeleton using advanced live-cell imaging systems, confocal laser scanning microscopy

3. *H. pylori*-mediated reprogramming of gastric epithelial cells: epithelial-mesenchymal transition (EMT)

- Investigation of the expression of EMT markers (E-cadherin, Snail, catenin, vimentin, etc.) in a set of gastric tumor cell lines by qPCR, Western blotting, gene sequencing, etc.
- Study of the promoter methylation status
- Treatment of cells with demethylating agents to restore gene expression

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