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Global Health Institute RECRUITING SEMINAR

Impact of the gut microbiota on intestinal tissue remodeling

Monday, April 14th, 2014 – 13h30
EPFL – room SV1717a

Christoph Reinhardt, PhD

University Medical Center, Johannes Gutenberg-University Mainz, Germany

host: Prof. Stewart Cole

Abstract:

The human intestine is the organ with the most rapid renewal rates in the body. The underlying pathways involved in gut development need to be tightly controlled. It harbors a densely colonized ecosystem, the gut microbiota. Gut microbial communities profoundly impact on mucosal morphology and cellular renewal. If the balance of signaling mechanisms that control intestinal renewal is disturbed either by dysbiosis, infection or by mutation of growth regulatory genes this can result in impaired intestinal barrier function, polyp formation or even inflammatory bowel disease (IBD) and the development of intestinal cancers. Intestinal inflammation (e.g. necrotizing enterocolitis, IBD, chemotherapy-induced mucositis) severely affects intestinal renewal and Crohn's patients are at increased risk of developing intestinal cancers. Now that we began to understand how the intestinal architecture and cell renewal is controlled, it is a timely and plausible consequence to use germfree (GF) mouse technology to study how colonization with a gut microbiota or single microbes impacts on the steady state of morphogenic signaling. To date, the pathways that are triggered by the gut microbiota and can modulate cellular renewal in the intestine are elusive. With GF mouse models we revealed that the gut microbiota triggers coagulation factor signaling thus eliciting remodeling of intricate capillary networks in the intestinal mucosa. Our research aims to explore how gut microbial communities can modulate the morphology of their habitat and we will pinpoint growth regulatory components that are affected by dysbiosis and acute intestinal inflammation. Detailed understanding of microbiota dependent morphogenic signaling will foster the development of new probiotics to ameliorate intestinal inflammatory disease states.