LS25-099 - Unraveling Host Glycobiology-Microbiome Interactions to Inform Precision Approaches in Colorectal Cancer

Zusammenfassung

Colorectal cancer (CRC) remains a leading cause of cancer mortality, with management mainly guided by clinicopathological criteria and limited tools for predicting therapy response. Tumor-associated microbiomes are dysbiotic and linked to prognosis, yet the host factors shaping these microbiomes remain poorly understood. Aberrant glycosylation is a hallmark of CRC, driving tumor progression, immune evasion, and metastasis. While these changes are well documented, the role of glycans as active mediators of microbial colonization within the tumor microenvironment, cooperation, and therapy modulation has never been systematically investigated.

GlyCoNet-CRC pioneers the study of the host glycobiology–microbiome–therapy outcome axis in CRC. Leveraging the clinically annotated MUW CRC biobank (200 patients, 400 matched tumor/normal samples), the project integrates glycomics, microbial community profiling, and host–microbe (meta)transcriptomics with treatment response and survival outcomes. Tumor tissues from patients receiving adjuvant chemotherapy will be stratified by glycan profiles and microbial community types to identify predictive glycan-microbe signatures, including sex-specific aspects. Focus lies on polymicrobial networks involving pro-oncogenic taxa, such as Fusobacterium nucleatum. Findings will be validated in coculture systems of microbes and defined, glycoengineered cells and patient-derived CRC organoids. These models will recapitulate host glycan–microbe interactions under physiologic conditions and enable mechanistic dissection of microbial adhesion, biofilm formation, signaling, and chemotherapy metabolism.

By targeting an unexplored facet of CRC biology, GlyCoNet-CRC will generate statistically robust multi-omics data, identify predictive biomarkers, and define glycome-microbiome-directed therapeutic strategies. This innovative approach will integrate glycobiology and microbiome science into precision oncology, advancing personalized medicine in CRC.

Wissenschaftliche Disziplinen:
Cancer research (40%) | Microbiology (30%) | Glycobiology (30%)

Keywords:
colorectal cancerglycobiologymicrobiomemulti-omicsbiobankdiagnosticsbiomarker

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Weiterführende Links zu den beteiligten Personen und zum Projekt finden Sie unter
https://www.wwtf.at/funding/programmes/ls/LS25-099/