Research profile for applicants

Name of DKFZ research division/group:	***Microbiome and Cancer (D480)***
Contact person:	Dr. Eran Elinav e.elinav@dkfz-heidelberg.de
Group homepage: *Visit this website for further information on current research and recent publications.*	***https://www.dkfz.de/en/microbiome-and-cancer***

RESEARCH PROFILE AND PROJECT TOPICS

The Research Division of Microbiome and Cancer**,** a bridging division between DKFZ Heidelberg and the Weizmann Institute of Science, Israel, headed by Professor Eran Elinav, studies the cross-talk between cancer cells, immune cells, microbial colonization, and environmental factors. We investigate how individual bacteria, microbial consortia, and microbial perturbations through diet or xenobiotics interact with metabolic disruption and chronic inflammatory responses to influence carcinogenesis and metastasis across a range of preclinical models. In parallel, we study the longitudinal interactions between cancer therapies and the gut microbiota in patients and mouse models to explore causal relationships mediated by direct bacterium-host interactions or microbial metabolites.

Our research combines cutting-edge wet-lab approaches with advanced bioinformatic analyses to characterize microbiota from the oral cavity and gastrointestinal tract. We cover a broad spectrum of microbiome analyses, including bacteria and fungi, using high-resolution sequencing technologies. These studies are integrated with multi-omics characterization of the host immune system, including single-cell transcriptomics, proteomics, and metabolomics. To translate these discoveries into clinical applications, we conduct precision medicine-based studies that evaluate microbiota-targeted interventions such as dietary modifications and microbiota transfer strategies. Our main studied cancer and associated models include colorectal cancer, pancreatic cancer, breast cancer, leukemia, glioblastoma and, urinary bladder cancer, among others.

This project aims to investigate the cross-talk within the tumor microenvironment during the development and progression of cancer**.** Particular emphasis will be placed on understanding the relationships between microbial communities, tumor cell states, immune responses, and metabolic changes. The successful candidate will apply state-of-the-art approaches to identify and characterize microenvironmental niches associated with distinct microbial signatures and host responses.

This project seeks to uncover novel mechanisms linking microbiome composition with tumor biology, immune regulation, and metabolic adaptation. The work will employ a broad multi-omics framework, including high-resolution microbiome sequencing, metabolomics, culturomics, immune profiling, and advanced computational analyses. Depending on project development, experimental approaches may span *in vitro* and *in vivo* systems, including cell and organoid models, microbial cultures, and specialized animal models.

The project is embedded within an international research environment led by Prof. Eran Elinav, connecting the Research Division of Microbiome and Cancer at DKFZ with the Elinav lab at Weizmann Institute of Science. The successful candidate will have the opportunity to shape and develop their project through close interaction with Prof. Elinav and senior researchers, while benefiting from the collaborative expertise and resources available across both institutions.