Research profile for applicants

Name of DKFZ research division/group:	***Personalized Medical Oncology (A420)***
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Group homepage: *Visit this website for further information on current research and recent publications.*	*https://www.dkfz.de/en/personalized-medical-oncology*

RESEARCH PROFILE AND PROJECT TOPICS

Our divison centers on lung cancer and the tumor microenvironment (TME) as a key determinant of tumor growth and therapeutic response, such as to immunotherapy. We study multiple TME compartments, including immune cells, cancer-associated fibroblasts (CAFs), endothelial cells, and neurons, and their bidirectional crosstalk with tumor cells. In parallel, we aim to clarify how sex-specific biology influences outcomes of immune checkpoint inhibitors and other precision therapies. We primarily pursue projects that translate mechanistic insights from basic research into clinical practice through Investigator-Initiated Clinical Trials (IITs) and, conversely, bring clinical observations back into the laboratory to dissect their molecular underpinnings – a bidirectional approach we refer to as circular translation.

Within this framework, the postdoctoral project will dissect how biological sex and cancer-associated fibroblasts (CAFs) jointly shape the tumor microenvironment and modulate responses to immune checkpoint inhibition. Increasing evidence indicates that sex chromosomes and sex steroid hormones influence immune effector functions, tumor cell biology, and tumor–immune interactions, yet the contribution of stromal cells, particularly CAFs, to these sex-specific effects remains poorly understood. CAFs are key regulators of extracellular matrix remodeling, cytokine and chemokine networks, and immune cell recruitment and exhaustion; their sex-dependent transcriptional and functional states may critically determine whether patients respond to checkpoint inhibitor therapy or exhibit inherent resistance. The postdoc will leverage single-cell and spatial transcriptomics, as well as multiplex imaging to define CAF-centered, sex-specific microenvironmental architectures in lung tumors. These data will be integrated with clinical information from well-annotated patient cohorts and ongoing precision oncology trials. Mechanistic hypotheses will be functionally tested in patient-derived organoids and CAF–immune cell co-culture systems.

Ultimately, the project aims to identify CAF-based, sex-specific biomarker signatures and rational combination strategies that enable more personalized, effective, and equitable use of immune checkpoint inhibitors.