

Research profile for applicants

Name of DKFZ research division/group:	<i>Pediatric Neurooncology/Prevention and Liquid Biopsies (B062)</i>
Contact person:	<i>Kendra Maaß</i> <i>k.maass@kitz-heidelberg.de</i> , +49 6221 42 1792
Group homepage: <i>Visit this website for further information on current research and recent publications.</i>	<u>https://www.dkfz.de/en/pediatric-neurooncology/prevention-and-liquid-biopsies</u>

RESEARCH PROFILE AND PROJECT TOPICS

The Maass Lab is dedicated to developing next-generation liquid biopsy technologies to transform the diagnosis, stratification, and monitoring of children with cancer. Our research integrates cutting-edge molecular biology with computational multi-omics to bridge fundamental discovery and clinical translation (Smith, Fischer, Han et al., 2026, Nature Cancer; Maass, Puranachot et al., 2026, Genome Medicine; Seitz, Catacora, Scheuermann, Fischer et al., 2026, Research Square). Through exceptional access to longitudinal patient samples collected within prospective clinical trials, we investigate how circulating biomarkers can reveal tumor evolution, treatment response, and mechanisms of resistance to innovative immunotherapies.

A central focus of the laboratory is the use of liquid biopsies to monitor tumor burden alongside immune-system activity during immunomodulatory treatment. We aim to decode the dynamic tumor–immune interactome and determine how circulating molecular signals reflect mechanisms of action, immune activation, therapeutic resistance, and immune exhaustion. By integrating tumor-derived and immune-derived biomarkers, we seek to generate biological, mechanistic, and clinically actionable insights into immunotherapy responses.



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Our multidisciplinary research combines liquid biopsy workflows with genomics, epigenomics, transcriptomics, single-cell technologies, and advanced sequencing approaches. These datasets are analyzed using bioinformatic pipelines, statistical modeling, machine learning, and multi-omic integration in R and Python. Experimental findings are validated through molecular and cellular biology studies using patient-derived samples, enabling close interaction between wet-lab discovery and computational interpretation.

A key strength of the Maass Lab is its close collaboration with clinicians, computational biologists, and translational scientists, creating an environment in which discoveries can move rapidly from bench to bedside. Current projects span innovative wet-laboratory studies, molecular investigations of pediatric tumor biology, and integrative bioinformatic analyses of complex multi-omic datasets. Team members contribute to the development of robust liquid biopsy workflows, next-generation sequencing technologies, and analytical frameworks that support clinical decision-making and the design of future immunotherapy trials.

The laboratory provides an outstanding environment for interdisciplinary scientists interested in combining experimental and computational approaches. By advancing liquid biopsy assays and integrated multi-omic strategies, we aim to improve disease monitoring, patient stratification, and therapeutic outcomes, while deepening our understanding of the tumor–immune ecosystem and advancing precision pediatric oncology for children and adolescents worldwide.



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