Project abstract

Name of DKFZ research division/group:	Division of Translational Medical Oncology (B340)
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PROJECT PROPOSAL

Multidimensional tumor characterization for precision oncology

We aim to improve how we practice oncology towards a more rational and personalized approach. Our division engages in all aspects of the translational research process, including one of the most comprehensive molecular diagnostics programs in oncology worldwide (DKFZ/NCT/DKTK MASTER, https://www.nct-heidelberg.de/master), clinically guided exploratory research projects, and the implementation of innovative clinical trials (e.g., ClinicalTrials.gov Identifiers NCT03110744, NCT03127215, NCT04410653, and NCT04551521). Within the MASTER program, we have analyzed more than 6,200 tumor samples by whole-exome/genome and RNA sequencing and genome-wide DNA methylation profiling and discovered previously unrecognized recurrent genetic alterations – including complex genomic, epigenomic, and transcriptomic signatures – in various tumor types. Clinician scientists will have the unique opportunity to explore these data *in silico* using advanced computational and informatics frameworks, or in the laboratory to study the functional and mechanistic consequences of molecular alterations identified in human cancer patients, and, in select cases, feed the results back into the clinic. A rapidly expanding focus of our work is the integrative analysis of multidimensional datasets using data science and medical informatics approaches, with the goals of generating laboratory-testable hypotheses and translating molecular complexity into clinically actionable knowledge and decision support in precision oncology. Furthermore, we are very interested in intratumoral heterogeneity as a cause of treatment failure, and we have made it our mission to advance our understanding of this phenomenon and to develop strategies to address it therapeutically, as part of the HEROES-AYA consortium established within the National Decade Against Cancer (https://bit.ly/3DHS3X6). To help realize the promise of personalized oncology based on

scientific inquiry and biology-guided clinical decision-making, we seek highly motivated candidates passionate about applied cancer research.