

Fraunhofer ITEM

Business Strategies

Exploring the minimal residual disease to prevent lethal metastatic disease

Currently, one in four deaths is caused by cancer – mainly as a result of metastatic disease spread. Thus, the Project Group concentrates on the development of diagnostic tests to detect disseminated cancer cells early in the disease and to predict the response to therapy of metastatic progenitor cells. Since available cancer drugs are ineffective in most patients, we also aim to develop better therapies by targeting the metastatic precursor cells.

For this we apply novel methods for molecular single cell analyses in order to detect and comprehensively characterize metastatic precursor cells, the target cells of cancer drugs, which are extremely rare at early disease stages. As a first result, we found that primary tumours and disseminated cancer cells clearly differ in genotype and phenotype. Therefore, the molecular characteristics of the therapy target cells cannot be inferred directly from the properties of the primary tumour. Consequently, new systemic therapies and companion diagnostic tests are needed, which predict whether the therapy target cells will respond to (experimental) drugs. Such tests would greatly accelerate drug development.

The Project Group provides methods for genome and transcriptome analysis of single cells, bioinformatic analyses of high-dimensional single cell data, development of new diagnostic and predictive tests, and supply of in vitro and in vivo models for preclinical testing of systemic therapies.

The projects are carried out in a unique infrastructure. The Fraunhofer Project Group cooperates with the Chair of Experimental Medicine and Therapy Research of the University of Regensburg, which runs an accredited laboratory for diagnosing minimal residual disease of solid cancers in the Department of Pathology. Therefore, constant sample supply is guaranteed, which offers new possibilities for translational research.

Patents, Licenses, Co-operations

The group leader Prof. Dr. Christoph Klein also holds the Chair of Experimental Medicine and Therapy Research, Faculty of Pathology, University of Regensburg.