

## Fraunhofer Institute for Cell Therapy and Immunology IZI

# Advanced Analytics Technology Platform

The Advanced Analytics technology platform bundles existing competencies at Fraunhofer IZI in the areas of chromatography and mass spectrometry, flow cytometry, microscopy, sequencing as well as bioinformatics and machine learning.

- Enabling comprehensive analyses using latest technologies and expertise under BSL-2 conditions
- Development of assays on a small scale or for performance of proof-of-concept studies (according to customer-specific requirements)
- Integrative collaboration of the subdivisions
- Supporting partners and customers in design and execution of experiments, selection and use of appropriate equipment, and multi-modal data analysis



## Next-Generation Diagnostics: Genomics & Transcriptomics for diagnostics and research

### Research topics

- Genomics & Transcriptomics for clinical and non-clinical research e.g. in oncology and immuno-oncology
- Biomarker discovery and validation using next-generation sequencing and PCR-based methods
- Pathogen testing (e.g. SARS-CoV2 detection)

### Competences

- Classical NGS methods:
  - Whole transcriptome sequencing (mRNA and total RNA)
  - Whole genome and exome sequencing
  - Small genome and 16S sequencing
- Advanced NGS methods
  - Single-cell multi-omics
  - Spatial transcriptomics



### Contact

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## Medical Bioinformatics for Precision Medicine

### Research topics

- Medical bioinformatics in oncology and immuno-oncology
- Software development for precision medicine
- Biomarker discovery and validation
- Computational RNA biology & Functional Genomics

### Competences

- Machine learning & multi-omics: Machine learning & AI for deep molecular data; multi-modal data science; statistical learning; integrative bioinformatics; pipeline development;
- Software components for IVDs: Development of algorithms and software components for medical devices in particular in-vitro diagnostic devices (IVDs) and lab developed tests.

## Chromatography & Mass Spectrometry

### Competences

- Preparative chromatographic separations (RP, SEC, IC)
- Identity determination and quantification of isolated proteins by nanoLC-MS/MS and peptide mass fingerprinting (PMF)
- MS-based elucidation and detection of protein modifications, isoforms and protein interactions
- Consulting, sample preparation, performance and evaluation of proteomics studies
- Determination of toxins and metabolites in biofluids by Multiple Reaction Monitoring (MRM)
- Analysis of active substances and their degradation products by MRM
- Characterization of ssDNA and ssDNA conjugates



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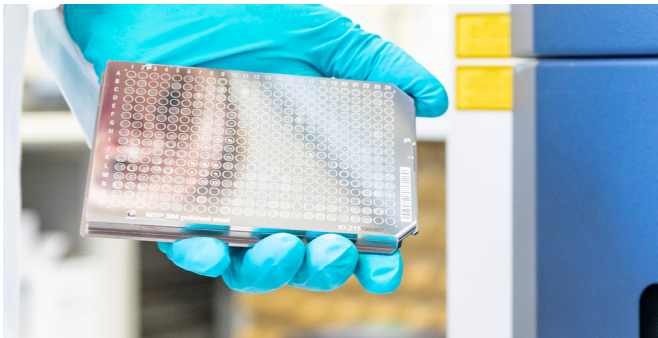
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## Chemical Analytics

### Competences

- Development and validation of LC-MRM methods for the quantification of biomolecules (e. g. small molecules, proteins) in complex biological matrices like biofluids and tissue homogenates
- Analytical services for preclinical studies (GLP/non-GLP) in the fields of pharmacokinetics and toxicology (LC-UV/Vis, LC-MRM)
- Quality control for intermediates and final products of biotechnological and pharmaceutical production processes (LC-UV/Vis, LC-MS/MS, MALDI-TOF/TOF)
- Characterization of active pharmaceutical ingredients (API) concerning purity, stability, release and permeability (LC-UV/Vis, LC-MRM, LC-MS/MS, MALDI-TOF/TOF)
- GLP-certified



### Contact

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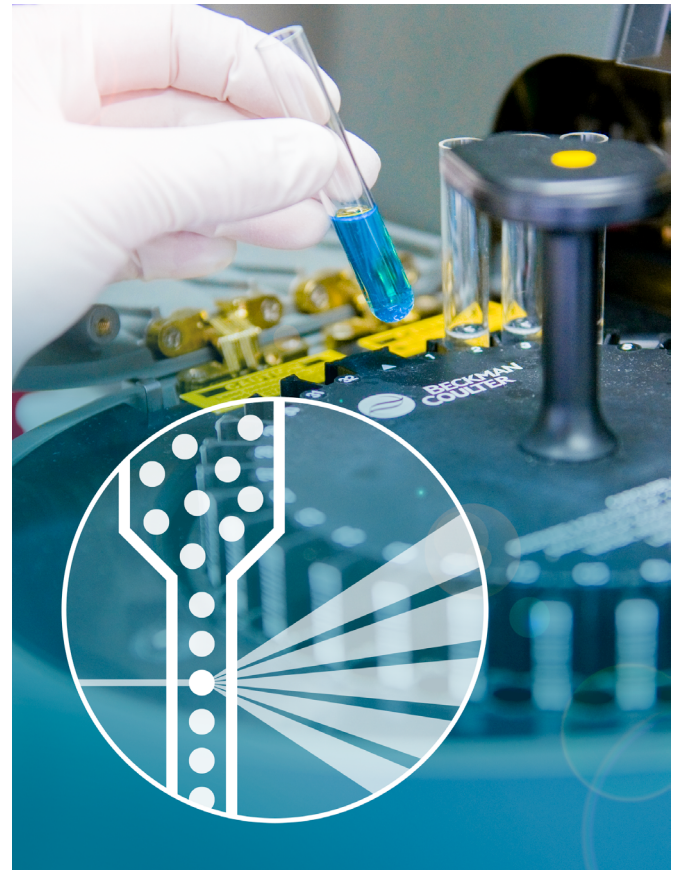
## Flow Cytometry and FACS

### Competences

- Cell-based assays (immunophenotyping, apoptosis, internalization, proliferation/cell cycle, migration, degranulation)
- Cell sorting
- Advice on set-up of experiments, evaluation and other flow cytometry-related topics

### Equipment (excerpt)

- Beckman Coulter: Navios Ex TM 10/3, CytoFlex
- Merck/Luminex: ImageStream-X MarkII, FLEXMAP 3D
- BD: Influx Cell Sorter
- Sartorius: IntelliCyt ique Gen 2
- Miltenyi: MACSQuant X



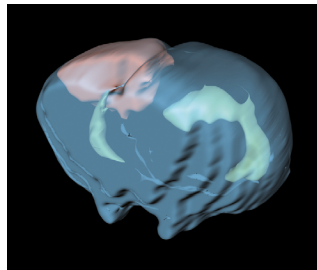
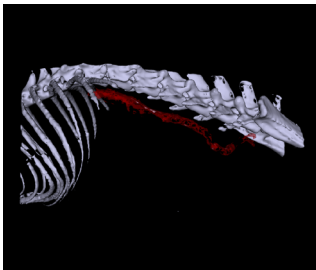
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## Experimental Imaging: Multimodal imaging for preclinical research

### Competences

- Acquisition and evaluation of various (also correlative) image data
- Brightfield, live cell, fluorescence and confocal laser scanning microscopy
- Slide scanning services
- In vivo imaging via magnetic resonance imaging (MRI), computed tomography (CT) and optical imaging (BLI/FLI) for small animals
- Microscopy training of users and technical support



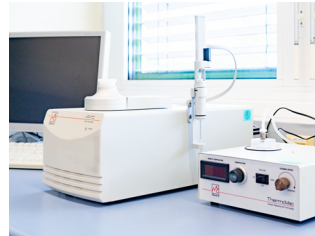
## Interaction Analysis & Immunoassays

### Competences

- Characterization of interactions between biomolecules (affinity, kinetics, thermodynamics, specificity) via Surface Plasmon Resonance (SPR), Isothermal Titration Calorimetry (ITC) and fluorescence polarization (FP)
- Quantification of biomolecules based on various immunoassays (e.g. ELISA) incl. TR-Fluorescence
- GLP-certified laboratory

### Equipment (excerpt)

- SPR – Bruker SPR-24 Pro, Biacore 3000
- ITC – Microcal VP-ITC
- FP & Immunoassay – BMG CLARIOstar



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