



# **CORE FACILITIES BOOKLET**

Cutting-edge technology platforms to enable and support your research

# ➔ CORE FACILITIES HEAD OFFICE

At Helmholtz Munich, more than 1500 scientists work together to discover personalized medicine solutions for environmentally triggered diseases to promote a healthier society in a rapidly changing world.

We ensure that our world-class researchers are supported by the very best scientific service platforms. Our eight Core Facilities provide a centralized infrastructure for fast, convenient, and affordable access to cutting-edge technologies and services. They are operated by staff with the expertise and skills needed to maximize their utility. Services are open to internal and external academic and industry users on a fee-for-service basis.

Core facilities make complex technology available so scientist achieve their ambitious research goals quicker. By offering a flexible 'end-to-end' service, from experimental design to data analysis, we support every step of the way. Cross-platform workflows enable state-of-the-art multi-omics approaches bringing together technical expertise from several specialties.

Our services include training courses and expert consultation. Cores are an essential source and repository for techniques and methods and a great exchange forum bringing together scientists across disciplines.

Together we are engaged in keeping our services within strategic focus and at the cutting edge of science. This booklet shows key facts on our cores at a glance.

Please contact us for further questions, we are here to help and look forward to working with you.



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# ➔ CORE FACILITIES

## MONOCLONAL ANTIBODIES

### MISSION

We provide expert support and service for the production, handling, and validation of custom-made monoclonal antibodies. Our custom reagents enable and support academic and commercial customers to reach their goals.

### HIGHLIGHTS

CF-MAB generates high-quality monoclonal antibodies in an automated high-throughput process, even against difficult targets such as cell surface receptors and RNA- and post-translational modifications. Using tumor cell-derived vesicles as immunogen we identify new biomarkers and generate neutralizing antibodies, also for therapeutic applications. In collaboration with an international consortium, we developed highly specific antibodies for microglia characterization. Many of our antibodies have been licensed by commercial partners.

### FEATURED INSTRUMENTS

- TECAN Fluent 780 automated liquid handler
- TECAN Spark multimode microplate reader
- Sartorius iQue Screener Plus flow cytometer
- Cytiva ÄKTA Avant 25 protein purification system
- Cytiva ÄKTA Pure 150 protein purification system
- Sartorius Octet R2 protein Analysis System
- KD Bio Hollow Fiber Bioreactor
- Charles River Endosafe® Nexgen-PTS™

### TEAM AND CONTACT

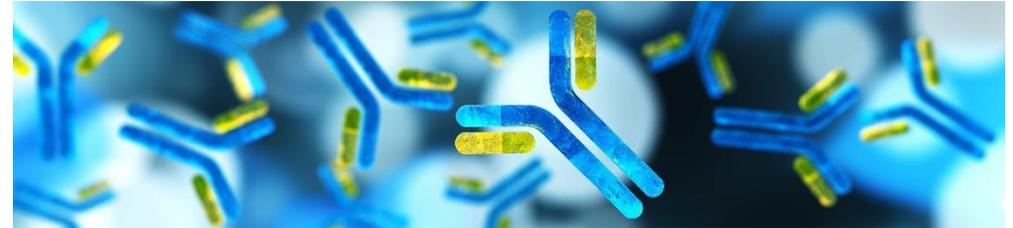
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### SERVICES

- In depth consultation on-target design and antibody validation
- Immunization and automated high-throughput screening
- Generation of custom-made antibodies
- General antibody supply
- Antibody purification (also large-scale)
- Antibody labeling
- Affinity measurements
- Long-term hybridoma cryo-conservation
- Recombinant hybridoma cloning
- Antibody licensing to industry partners



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### NETWORKS

SyNergy – Munich Cluster for Systems Neurology  
DZNE – German Center for Neurodegenerative Diseases

## ➔ CORE FACILITIES

# PATHOLOGY AND TISSUE ANALYTICS

### MISSION

CF-PTA offers state-of-the-art technical and professional services in pathology and microscopy for all aspects of tissue-based research individualized to project needs. Our portfolio includes extensive support in image data analysis and access to tailored training. With many years of experience, we continuously engage in method development and offer assessment of tissue pathology in disease and after drug treatment..

### HIGHLIGHTS

Our scientific service offers a full range of histopathological techniques, also for difficult materials such as fatty and neuronal tissue or pancreas. We are experts in digital pathology and qualitative and quantitative image analysis. We have successfully established 3D imaging of whole transparent organs and support spatial transcriptomics approaches together with CF-Genomics.

### FEATURED INSTRUMENTS

- Miltenyi Biotec UltraMicroscope II
- Zeiss Lightsheet Microscope Z1
- Zeiss Upright Confocal Microscope LSM 880 with Airyscan
- Zeiss AxioScan 7 automated digital slide scanner (BF/FL)
- Sakura TissueTek VIP6 & TissueTec6 automated embedding and tissue processing station
- Roche Ventana Discovery Ultra automated Immunostainer
- Leica Histocore Spectra automated Multistainer

### TEAM AND CONTACT

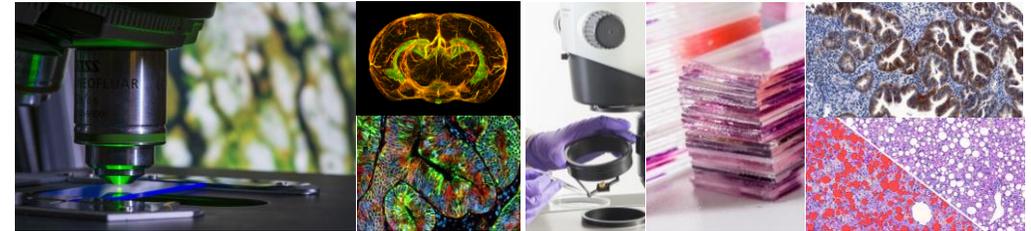
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### SERVICES

#### PATHOLOGY

- Automated, standardized tissue processing (Frozen and FFPE)
- Conventional and special microtome techniques (e.g. transcriptomics, microchips)
- Standard and special staining techniques (Immunohistochemistry, Immunofluorescence, Histochemistry, FISH, Spatial Transcriptomics)
- Construction of Tissue Micro Arrays (TMA)
- Quantification by comprehensive Image Analysis
- Digital Pathology
- Scientific Support (e.g. Study design, structured histology report)

#### MICROSCOPY

- Lightsheet Fluorescence Microscopy
- Confocal Microscopy
- Fluorescence Microscopy
- Digital Slide Scanner for Brightfield and Fluorescence
- 2D / 3D Image Analysis and Visualization Platform
- Expert data analysis support
- Training in basic and advanced microscopy

### NETWORKS

Labs@location Partner of ZEISS

# ➔ CORE FACILITIES

## GENOMICS

### MISSION

CF-Genomics provides state-of-the-art infrastructure, training, and expert knowledge for Next Generation Sequencing, Genotyping, and Bioinformatics to enable a wide range of genomic research. Our service supports internal and external customers in basic science, discovery, and translational studies.

### HIGHLIGHTS

CF-Genomics offers a one-stop-shop for genomics workflows. NGS Sequencing including single-cell applications, Genotyping (Illumina Microarray), and Bioinformatics experts work together to provide full service while keeping the flexibility to accept requests at any step of the process. A complementary portfolio of consultation services, assay development, training courses and publication and grant support help our users in achieving their goals.

### FEATURED INSTRUMENTS

- Illumina Novaseq 6000 sequencer
- Illumina Nextseq 1000 sequencer
- Illumina MiSeq sequencer
- 10x Genomics ChromiumX
- Agilent Bravo Library Prep Robots
- Tecan Fluent 480 liquid handling robot
- Perkin Elmer Chemagic 360 and Qiagen QiaCube extraction robots
- Illumina iScan with autoloader
- Applied Biosystems SeqStudio and QuantStudio Flex7

### TEAM AND CONTACT

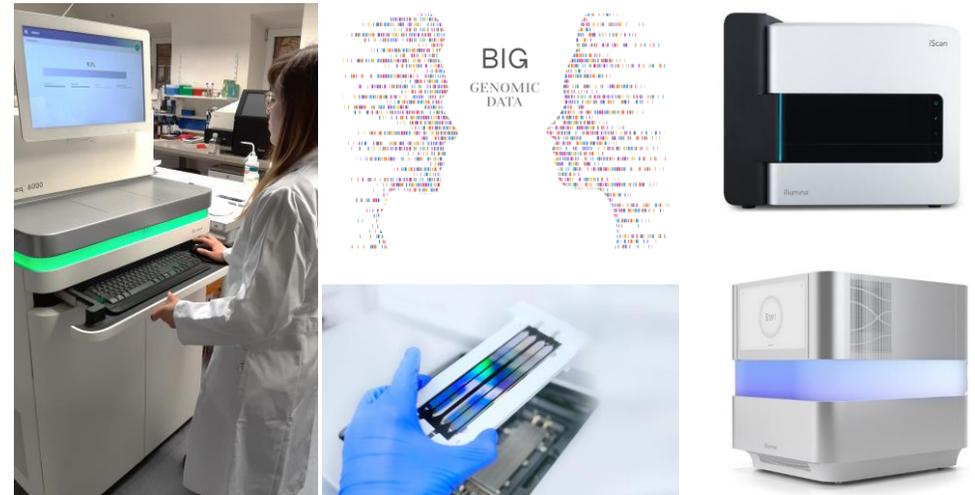
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Head of CF-GEN

Dr. Peter Lichtner (Genotyping)  
Dr. Thomas Walzthöni (Bioinformatics)

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### SERVICES

- **Consultation:** Experimental design, data analysis, and troubleshooting
- **DNA/RNA isolation & QC:** Automated extraction from various eukaryotic cell types and tissues, QC portfolio for DNA and RNA
- **Library Preparation:** Manual and automated for many applications (e.g. WGS, RNA-seq, Exome, Twist, panel library, single-cell library)
- **NGS Sequencing:** Any Illumina compatible pool for sequencing
- **Genotyping:** Automated high throughput Illumina arrays
- **Sanger Sequencing:** for fragments up to 800 bp
- **Bioinformatics:** Data processing and training for NGS applications, including single-cell workflows

### BIOINFORMATICS PORTFOLIO

- Primary processing and data management for the NGS platform
- Development and provision of analysis pipelines for various NGS applications
- Consultation, customized analysis, mentoring, and knowledge transfer projects
- Training to enable users for independent analytics and visualizations

# ➔ CORE FACILITIES

## METABOLOMICS AND PROTEOMICS

### MISSION

CF-MPC enables state-of-the-art analysis of metabolites and proteins in a broad range of sample matrices. We apply targeted and non-targeted approaches to characterize and quantify the proteome or metabolome of a sample to gain a better understanding of disease processes, drug-target interactions and to identify novel biomarkers.

### HIGHLIGHTS - PROTEOMICS

Our expert team has longstanding experience with comprehensive support from study design and method development to analysis and interpretation of high-dimensional data sets. CF-MPC is an early adopter of OLINK technology and was the first accredited provider for both OLINK Target96 and OLINK Explore in Germany. We were the organizer of ClinspectM, the first Munich area clinical proteomic ring trial, and organizer and partner in several national and international proteomic ring trials.

### FEATURED INSTRUMENTS

- 2 x Thermo Scientific Q Exactive HF coupled with Ultimate3000
  - Thermo Scientific Q Exactive HF-X coupled with Ultimate3000
  - Fluidigm Biomark HD
  - SPT Biotech Mosquito and Dragonfly robotics
  - Eppendorf EpMotion robot
- } Olink platform



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### SERVICES

- Quantitative proteome profiling by LC-MSMS (Data Dependent (DDA) and Data Independent Acquisition (DIA))
- Extracellular matrix analysis with quantification of collagen modifications
- Phospho-Proteomics and other post-translation modification analyses
- Interactomics - Quantitative analyses of protein complexes (with protein/DNA/RNA)
- Profiling of total RNA binding proteome
- Immunopeptidomics (profiling of MHC/HLA-bound peptides)
- Target validation of antibodies
- Tailored targeted quantification (Parallel Reaction Monitoring - PRM)
- Targeted proteomics profiling: OLINK Target96 and OLINK Explore
- Method development
- Data analysis and interpretation

### NETWORKS

- Board of Directors, German Proteomics Society
- Member of the Clinical Mass Spectrometry Center Munich (ClinspectM)
- Member of the Research cores for mass spectrometry in systems medicine (MSCoreSys)
- Member of the Human Plasma Proteome Project (HPPP), Human Proteome Organisation (HUPO)
- Member of Helmholtz Graduate School (HELENA)

### TEAM AND CONTACT

**Dr. Stefanie Hauck**  
Head of CF-MPC

Dr. Juliane Merl-Pham - Deep phenotyping, ECM  
Dr. Ann-Christine König - Interactomics  
Dr. Christine von Törne - Clinical proteomics, PTMs  
Dr. Agnese Petrera - Olink platforms



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# ➔ CORE FACILITIES

## METABOLOMICS AND PROTEOMICS

### MISSION

CF-MPC enables state-of-the-art analysis of metabolites and proteins in a broad range of sample matrices. We apply targeted and non-targeted approaches to characterize and quantify the proteome or metabolome of a sample to gain a better understanding of disease processes, drug-target interactions and to identify novel biomarkers.

### HIGHLIGHTS – METABOLOMICS

Our expert team has long-standing expertise in analysis of the metabolome, the complement of all small molecules (typically <1500 Da). The highly dynamic read-out of the metabolome is influenced by genetics, diet, and environment and allows the understanding of health and diseases and the development of new diagnostic tools.

CF-MPC uses liquid chromatography coupled to mass spectrometry (LC-MS) for the detection metabolites in different matrices from various species. We are actively involved in the development of new analytical as well as data analysis methods and participate in national and international metabolomics efforts, e.g. working groups of the Deutsche Gesellschaft für Metabolom Forschung (DGMet) and the Metabolomics QA & QC Consortium (mQACC).

### NETWORKS

- Certified laboratory of Biocrates life sciences AG
- Board of Directors, Metabolomics Society
- Member of Helmholtz Graduate School (HELENA)

### TEAM AND CONTACT

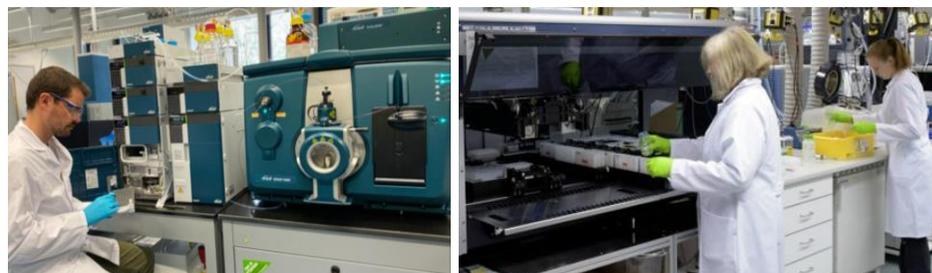
**Dr. Michael Witting**  
Co-Head of CF-MPC

Dr. Cornelia Prehn - Biocrates p180 and Bile Acids  
Dr. Jutta Lintelmann - Biocrates MxP Quant 500  
Dr. Mark Haid - Lipidyzer and Eicosanoids  
Dr. Anna Artati - Non-targeted Metabolomics  
Dr. Alex Cecil - Bioinformatics



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### FEATURED INSTRUMENTS

- Sciex ZenoTOF 7600 with Sciex ExionLC
- Sciex QTrap6500+ with SelexION with Sciex ExionLC
- Sciex QTrap5500 with SelexION with Shimadzu Nexera UHPLC
- Sciex QTrap5550 with Agilent 1290 Infinity II UHPLC
- QExactive with Waters Acquity UPLC
- QExactive Plus with Waters Acquity UPLC
- Sciex API4000 with Agilent 1260 HPLC and CTC pal autosampler
- Hamilton lab robotic systems for sample preparation

### SERVICES

- Targeted metabolomics for different matrices, e.g. plasma, serum, cell culture and tissue extracts
  - Biocrates AbsoluteIDQ p180 kit
  - Biocrates AbsoluteIDQ® Bile Acids kits
  - Biocrates MxP® Quant 500 kit
  - Central carbon metabolism
- Targeted lipidomics for different matrices, e.g. plasma and different tissues
  - Eicosanoid quantification
  - Lipid quantification using Lipidyzer (>1000 individual lipid species)
- Non-targeted metabolomics
  - Using CF-MPC in-house developed metabolite database and accompanying data analysis pipelines
- Bioinformatics analysis of metabolomics data
- Custom assay development for metabolites not covered by currently existing approaches

# ➔ CORE FACILITIES

## STATISTICAL CONSULTING

### MISSION

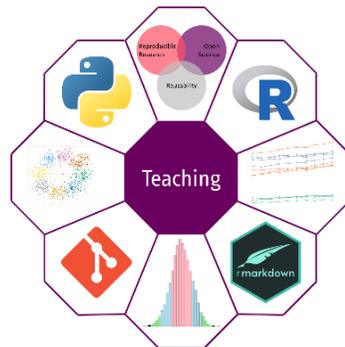
Our aim is to bring statistical expertise to science and extend the use and quality of statistics in science and research-oriented companies. Within all our services we promise high scientific standards, state-of-the-art techniques, and a tailored approach. Our services are open to internal and external users.

### HIGHLIGHTS

With more than five years of experience as a consulting unit, we have gained extensive expertise in various areas such as omics data, survival analysis, clustering and modelling strategies, among others. We have taught more than one hundred courses and are continuously developing new and exciting material



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Git: <https://git-scm.com/downloads/logos>



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### SERVICES

**Statistical Consulting:** We ensure the quality of analyses and apply modern statistical methods in practice. Data analysis, method development, experimental design, proofreading, preparation of publication material and more

**Teaching:** We train the participants of our courses in the application and understanding of statistical methods. We offer a wide variety of high-quality statistical and programming courses at different levels, e.g. “Introduction to R/Python” or “Reproducible and Open Research”

**Statistical Opinions:** We carry out sample size calculations and prepare statistical reports for animal experiment applications

**Data Analysis Café:** In 15-minute time slots, we answer quick questions about data problems, correct application of statistical methods, analysis code and more

### COLLABORATION PARTNERS

We work together with researchers at Helmholtz Munich, HIDA (Helmholtz Information & Data Science Academy), other Helmholtz Centers, external collaborators at universities, hospitals, other public institutions, and private companies.

### TEAM AND CONTACT

**Prof. Dr. Christiane Fuchs**  
Head of CF-STATCON

Dr. Hannah Marchi - Coordinator Consulting  
Dr. Elmar Spiegel - Coordinator Teaching



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## ➔ CORE FACILITIES

# INDUCED PLURIPOTENT STEM CELLS

### MISSION

CF-iPSC provides know-how, training, and hands-on support for researchers interested in working with human pluripotent stem cells (hPSCs). Our primary goal is to aid the Helmholtz Munich scientific community, external academic and industry clients to establish high-quality induced pluripotent stem cells (iPSC) disease models. With our three-dimensional organoid models we support users in basic and translational studies using state of the art in vitro approaches.

### HIGHLIGHTS

Over the past ten years, we developed an extensive toolbox of reprogramming services. We advise users on donor acceptance criteria as well as QC and experimental strategies for differentiation approaches. We will guide you to find the most suitable tissue of origin for a disease model and perform pilot experiments to ensure its suitability for your specific application. We also provide and distribute control iPSC cell lines.

CF-iPSC has successfully reprogrammed more than 90% of submitted patient samples from various disease backgrounds (e.g. PURA Syndrom, Bohring-Opitz Syndrom, IRF2BPL-related disorders, MPAN disorders). We are the leading partner within the iPStemRNA consortium and are trained for GMP-grade culture of human iPSC lines.

### TEAM AND CONTACT

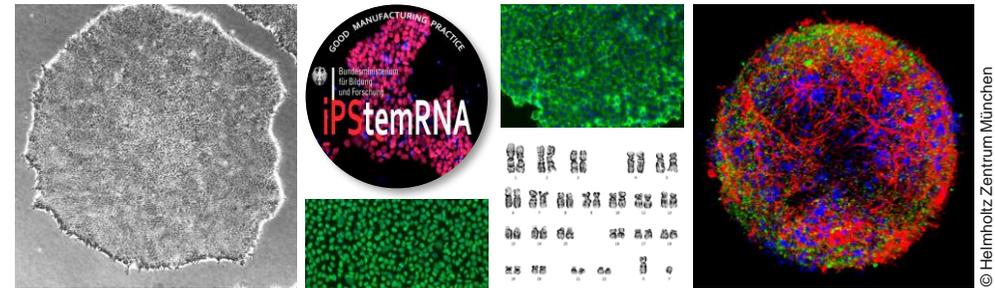
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### SERVICES

- Isolation & derivation of primary cells from various tissues (fibroblasts, PBMCs, stromal cells etc.)
- Reprogramming of primary tissues of interest using various non-integrating reprogramming methods: Sendai Virus, Episomal Plasmid and mRNA
- Basic characterization for hiPSC pluripotency & potency
- Basic characterization of genomic stability via G-Banding.
- Training for maintenance of hiPSC cultures and establishment of 2D/3D differentiation modality
- Organoid establishment & maintenance service
- Coming soon: Crispr/Cas editing services
- Distribution of hPSCreg registered control iPSC cell lines: HMGU1 and HMGU12 (scan barcodes for detail)



HMGU1



HMGU12

### NETWORKS AND COLLABORATION PARTNERS

We work together with researchers at Helmholtz Munich, Technische Universität München (TUM), Max-Delbrück Zentrum (MDC), Charite, Universität Ulm and Leiden University. We are partners in the PuriCore network and leading partner in the iPStem RNA consortium.

# ➔ CORE FACILITIES

## BIOBANK

### MISSION

Our scope is to make biosample-based research easier. CF-Biobank has more than 30 years of experience in sample processing and biobanking for internal and external clients. Currently, we hold a repository of more than one million human biosamples and associated data, available upon request to Helmholtz Munich scientists and cooperation partners for research on the prevention, diagnosis, and therapy of human diseases.

### HIGHLIGHTS

CF-Biobank with its worldwide unique and valuable collection of human biosamples is a major resource for research on complex diseases. Stored samples originated from various nationwide studies carried out in the Helmholtz Munich framework. Since 2018 the Biobank and accompanying lab services are certified according to EN ISO 9001: 2015. We offer storage of samples up to biological safety level 3\*\* (BiostoffV) at various temperatures, and can host internal client liquid nitrogen tanks. We closely work with other core facilities for cross-platform workflows and are actively transforming sample storage to a fully digitalized format.



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### TEAM AND CONTACT

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### SERVICES

- Quality controlled biosample long-term storage (-20°C, -80°C, LN<sub>2</sub>)
- Quality Management
  - Advice on QM-relevant topics
  - Provision of SOPs and templates for biobanking processes
  - Offer of internal audits
  - ELSI: Support for the design of ethics documents and concepts
  - IT and Data Integration: Assistance with data management and integration (e.g. LIMS, FAIR Data, Standards)
- Sample provision and logistics to HMGU researchers and external clients
- Access to LIMS system and temperature control system (internal only)

### NETWORKS

We are partners in numerous biobanking projects, such as:

- Biobanking infrastructure of DZIF (German Center for Infection Research)
- DZD biobank (German Center for Diabetes Research).
- German Biobank Alliance (GBA)
- Biosample Core Unit in NUM-NUKLEUS/NAPKON

# ➔ CORE FACILITIES

## LABORATORY ANIMAL SERVICES

### MISSION

Core Facility Laboratory Animal Services (CF-LAS) is a central service facility for biomedical research at the Center and ensures the breeding and housing of rodents (mouse, rat) and fish (zebrafish). We support users with various services related to animal welfare, training, and experimentation.

### HIGHLIGHTS

In collaboration with external clients and providers, CF-LAS has developed and patented new technologies for improving animal husbandry and hygienic monitoring of the facility. In partnership with Tecniplast spa, CF-LAS patented the *Interceptor system*; a simple, cheap and efficient tool to monitor and ensure that laboratory animals stay free of pathogens and minimize the need to utilize animals as sentinels.



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### SERVICES

- Maintenance, caretaking, and breeding of laboratory animals
- Veterinary care and hygienic monitoring of animal colonies
- Prescription and supply of veterinary medicines
- Advice and support for planning and conducting animal protocols: advice on the selection and development of animal models as well as on questions of animal welfare and laboratory animal science
- Training courses on laboratory animal science topics
- Ordering and transport of laboratory animals
- Embryo transfer and cryopreservation service
- Administration and training for animal registration in "MausDB" and key interface for reporting to the authorities

### NETWORKS

- Klinik und Poliklinik für Innere Medizin I und II der TU München
- Tecniplast spa, Buguggiate, Italy
- Tiermedizinische Fakultät der LMU München
- Central Animal Laboratory, DKFZ, Heidelberg



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Animal welfare officers: Prof. Dr. Heiko Adler,  
Dr. Andrea Hofmann, Dr. Julia Zorn,  
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