HZI HELMHOLTZ Centre for Infection Research

Matchmaking workshop between HZI and CSSB

Core Facility for translational proteomics (CFTP)

Head: Prof. Dr. Lothar Jänsch,
Dr. Dominik Körner, Andrea Abrahamik, Hedwig Schrader

Associated researchers: Prof. Dr. Frank Klawonn (Bioinformatics), Prof. Dr. Susanne Engelmann (Metaproteomes)

SCAN ME

Beginning in 2025, our research campus will host a core facility dedicated to translational proteomics, allowing researchers to request proteome-level studies for collaborative projects. This platform integrates expertise in biochemistry, mass spectrometry (MS), and biostatistics to meet the demands of translational research and systems-level approaches.

Mass Spectrometry devices

timsTOF Pro

- High throughput (up to 100 samples day)
- Ion mobility as an additional dimension to analyze samples with high complexity

Orbitrap Fusion

- Tribrid mass spectrometer
- High resolution and flexible
- Labile structures

Bravo

- Fully automated sample preparation

Contact persons

Prof. Dr. Lothar Jänsch
Head of the facility

Prof. Dr. Susanne Engelmann
Microbiology, Metaproteomes

Prof. Dr. Frank Klawonn
Bioinformatics, Statistics

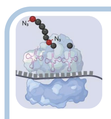
Dr. Dominik Körner
Phenotyting, Interactomics
Service, Quotations

Specialists (CPRO research group)

Dr. Marco van Ham
In-situ and spatial Proteomics

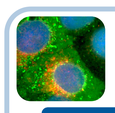
Dr. Tina Rietschel
PTM-Proteomics
Glycoproteomics

Proteomics workflow



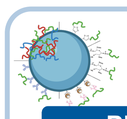
1. Labeling

- Chemical labeling
  - TMT
  - iTRAQ
- Metabolic labeling
  - SILAC
  - BONCAT
- Proximity ligation



2. Sampling

- Cell lines / primary cells
- Tissue
- Microorganisms
- Body fluids
- Recombinant protein
- Supernatants/Secretomes
- Cross-linked samples

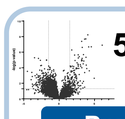


3. Enrichment/ Fractionation

- Phosphopeptides
- b-RP fractionation
- Surfaceome
- BONCAT proteomics
- Protein coronas
- Co-precipitation
- Glycoproteomics
- Laser dissection (LDM)

4. Analysis

- Data-dependent analysis
- Data-independent analysis
- Targeted proteomics
- Glycan analysis
- Labile modifications
- Thermal proteome profiling



5. Bioinformatics and Statistics

- Proteome Discoverer
- Peaks
- MS Fragger
- MaxQuant
- Spectronaut
- Spectrodive
- GlycoScape
- R

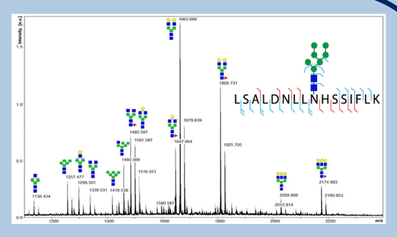
Full service | Collaborative

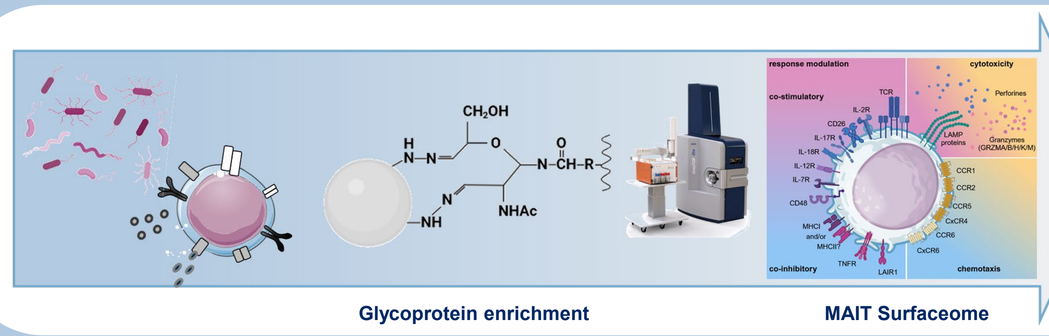
Collaborative research projects

Glycoproteomics

Identification of surfaceomes and glycosylated sites

- Hydrazide chemistry and KI-based identification of glycoproteins
- HILIC and lectin-bodies
- Stepped-collision-energy and ETD





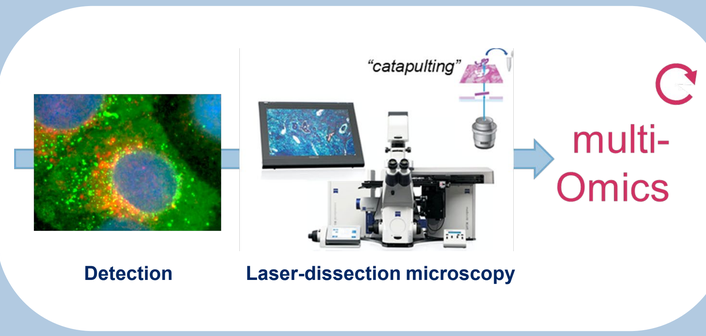
Glycoprotein enrichment | MAIT Surfaceome | Cryo-EM

With SFPR/RPEX (W. Blankenfeldt, J. v.d. Heuvel) DINF (H. Slevogt) and NIBI (C. Sieben). Planned cooperation: Lectin bodies (IVON, K. Metzdorf)

Spatial & *in situ* Proteomics

Protein characterization at site of infection

- *Ex vivo* proteomics
- Single cell proteomics
- Cellular & sub-cellular structures (e.g. nuclei)



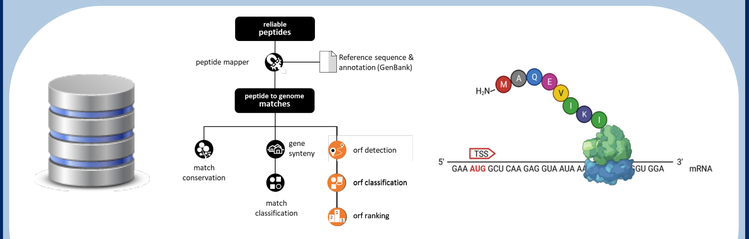
Detection | Laser-dissection microscopy

With VMED (M. Pils) and ZEIM (A. Steffen & M. Müsken).
Planned cooperations: IP Organoids (IVON: K. Metzdorf), C. Lenz (UMG-Göttingen)

Dark Proteomes

Identification of non-annotated proteins

- Improved genome annotation
- Identification of novel proteoforms
- Characterization of pseudogenes



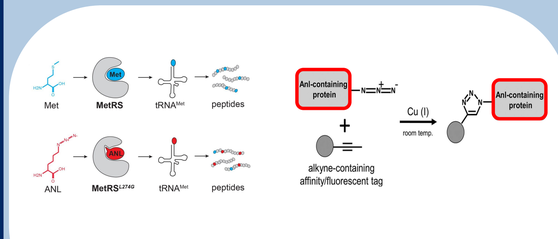
Database generation | ORF annotation | N-terminomics

With S. Fuchs (RKI): Fuchs *et al.*, 2021, PLoS Genetics;
Bartholomäus *et al.*, 2021, NAR; Engelmann and Fuchs, 2023, Proteomics

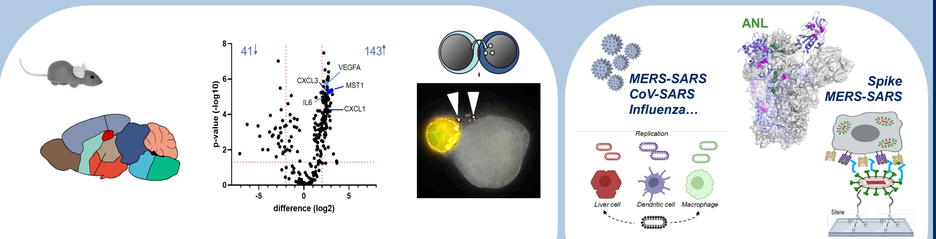
BONCAT - Bioorthogonal non-canonical amino acid tagging

In vivo metabolic labelling for selective and spatial protein identification

- Click chemistry-aided protein purification
- Characterization of translatomes, secretomes and trans-cellular molecular transport
- Labelling of micro-organisms for binding assays and interactomics



Incorporation of non-canonical amino acids | Protein enrichment using click chemistry



Spatial phenotyping
Prabhakar *et al.*, 2023, Glia

Translatomics & Secretomics
Jakob *et al.*, 2023, Front Immunol

Molecular Transport

Labelling of micro-organisms
EU-COMBINE with C. Sieben

With D. Dieterich (OvGU-MD): Prabhakar *et al.*, 2023, Glia. With M. Friese (UMC-Hamburg): Woo *et al.*, submitted to Cell
Jakob *et al.*, 2023, Front Immunol. With: C. Sieben (NIBI); A. Kröger (IMMI). Planned: with U. Kalinke (EXPI), with Hauser (DRFZ-Berlin)