Research Group Prof. Dr. Kerstin Otte

General research interests

The focus of our research group is the investigation and development of innovative concepts for molecular cell line engineering. A range of projects are currently under way to optimize various production cell lines for the manufacturing of biopharmaceuticals like antibodies for tumor therapy. We are particularly interested in applying aspects of synthetic biology, protein glycosylation, non-coding RNA and OMICs technologies to generate designer cell lines for future applications.

The Otte Lab hosts master and PhD students as well as postdoctoral students since 2011. We cooperate with numerous national and international academic laboratories and industrial partners. Our funding is provided by national research funding agencies as well as industrial cooperation partners. We are open for new projects in the area of applied and innovative cell development research.

The Otte Lab (University of Applied Sciences Biberach, Institute of Applied Biotechnology)

INSTITUT	Institute for Applied Sciences (IAB)
RESEARCH AREA	**Cell line development**
ANSPRECHPARTNER/IN	Prof. Dr. Kerstin Otte

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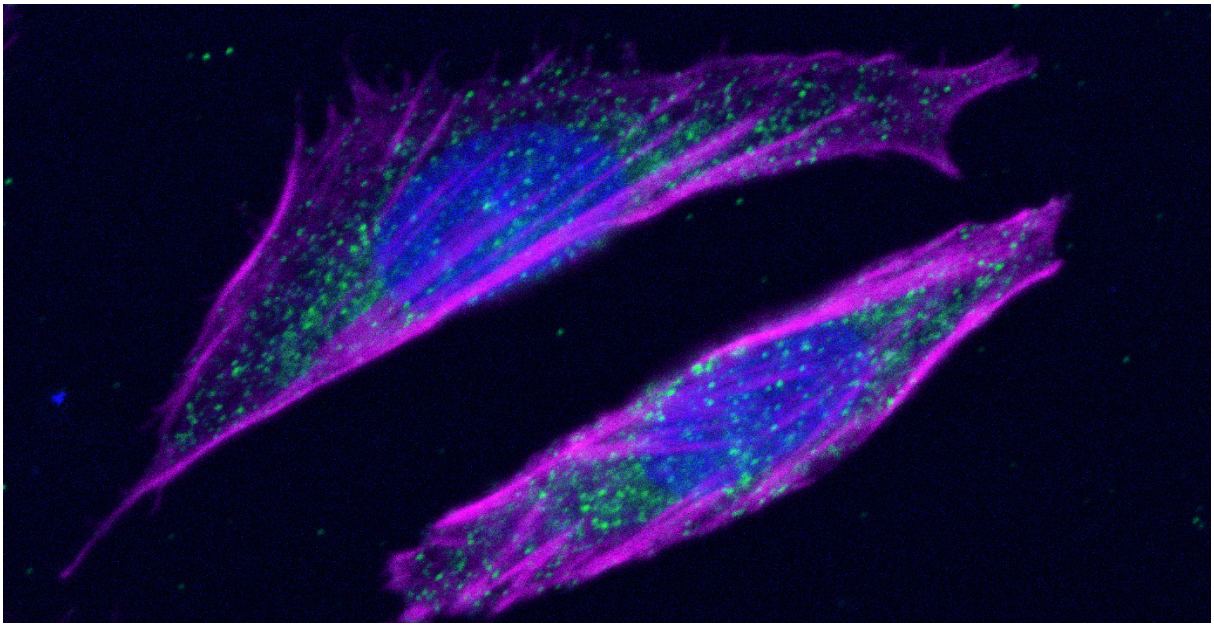
PROmiGlykAN: Process chain for the production of therapeutic glycoproteins using miRNA regulation and glycan analytics

Modern biopharmaceuticals as monoclonal antibodies for the treatment of cancer, are highly complex protein drugs. The biological effect is usually dependent on so called post translational modifications, including specific glycan structures on protein molecules. For the industrial production of biopharmaceuticals, CHO are the main production hosts, although they don´t produce proteins carrying human glycan structure. Since this may lead to immunological side effects and lowered efficacy of the drugs, this cooperation project between academia and industry aims at modulating glycan structures using the highly innovative miRNA technology to modify glycan patterns on protein drugs. Synthetic biology will lead to production cell lines generating pre-defined glycan patterns to facilitate reliable production of high quality biopharmaceuticals.

Funding: BMBF I Forschung an Fachhochschulen I IngenieurNachwuchs I Rentschler Biopharma



Synthetic biology to generate designer cell lines

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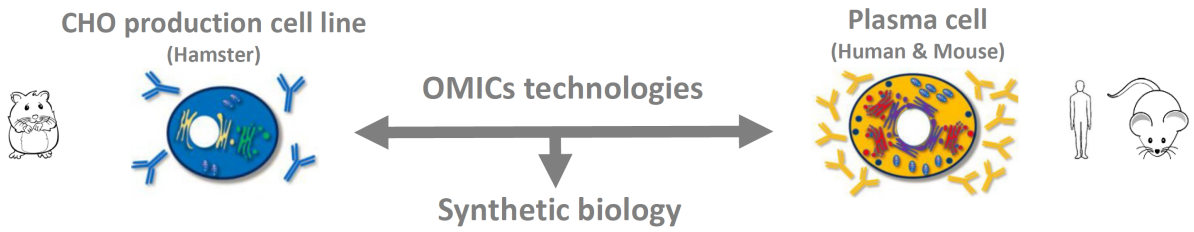
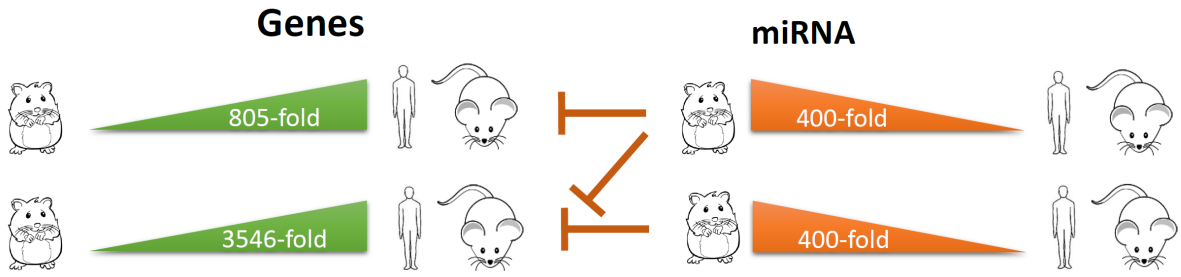
CHOmics: form natural production cells toward synthetic CHO-plasma hybrids for biopharma production

Recombinant monoclonal antibodies are highly effective drugs for indications as tumor or autoimmune diseases. Chinese hamster ovary (CHO) cells are the main production hosts in the pharmaceutical industry. However, these cells are not naturally equipped for high level antibody production. Nature has developed specialized antibody production cells during millions of years of evolution: the plasma cells of our immune system. CHOmics is a cooperation project between academic and industrial partners to exploit the natural blueprint for optimized bioproduction. Using a systematic approach, molecular and cellular properties of CHO and plasma cells are explored using OMICs technologies. Synthetic biology involving *state-of-the-art* technology as CRISPR/Cas9 will finally be used to create designer cell lines combining the highly evolved production and secretion characteristics of plasma cells with sophisticated fermentation properties of CHO cell lines.

Funding: BMBF I Forschung an Fachhochschulen I ProfUNT I Boehringer Ingelheim



CHOmics principle: OMICs technology will identifiy molecular targets for synthetic biology



Differential gene and miRNA expression between CHO and Plasma cells

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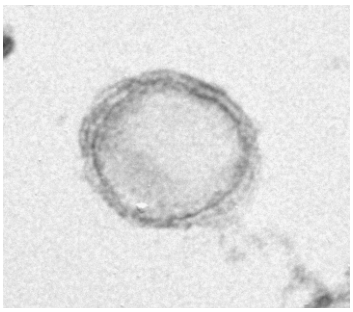
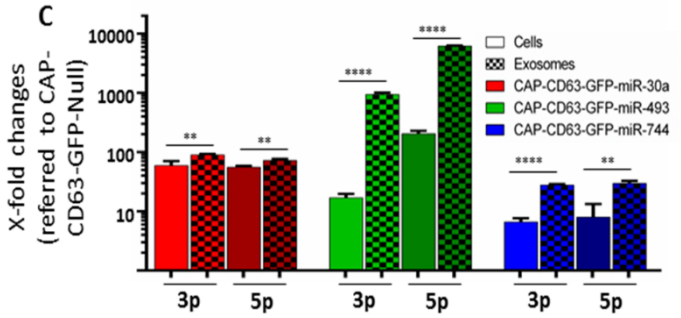
InnoSÜD: Angewandte Promotionen

Exosomes are small membrane bound extracellular vesicles produced by mammalian cell lines. They belong to the novel class of cell therapeutics and are currently developed as direct therapeutics or natural drug delivery vehicles. Exosomes may be used to deliver innovative drugs as therapeutic microRNAs (miRNAs). The current project aims in cooperation with Ulm University at the development of novel strategies to load, target and produce exosomal drug delivery vehicles.
Funding: BMBF I Innovative Hochschule

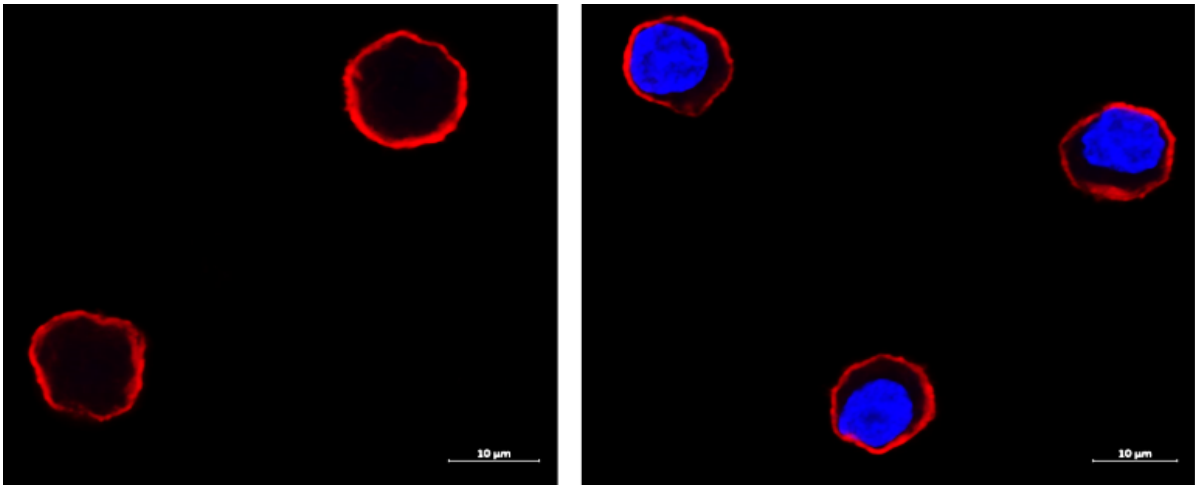




Exosomes: electron microscopy of exosome (100nm diameter) and analysis of miRNA loading by qPCR.

SURFACEome

Molecular characterization of cell lines often includes the application of so called OMICs technologies, which include the analysis of the entirety of e.g. DNA, RNA, proteins or metabolites of cells. CHO cells as the main production hosts for biopharmaceuticals are well characterized on molecular level, however, the entirety of the surface proteins – the surfaceome – is yet unknown. SURFACEome therefore aims at the identification of the CHO surface proteins using a highly innovative experimental setup. The differential analysis of surface proteins may be used to identify biomarkers for various applications for industrial cell line development.
Funding : MWK-BW I Innovative Projekte



SURFACEome: Identification of cell surface proteins (red: labeled surface proteins, blue: cell nucleus)

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Previous projects

Identification and characterization of production bottlenecks in CHO cells

- Funding: Boehringer Ingelheim

Increased bioassay productivity and quality by standardization and automation (Automation

- Funding: Boehringer Ingelheim

Crossing Barriers with bio-based therapeutics

- Funding: Deutsche Forschungsgemeinschaft (DFG)

CAP-Exsosomes

- Funding: CEVEC pharmaceuticals

Entwicklung von Hochproduktionszelllinien für ressourcenschonende Herstellung von Biopharmazeutika

- Funding: Deutsche Bundesstiftung Umwelt (DBU)

KPK-PBT: Kooperatives Promotionskolleg Pharmazeutische Biotechnologie

- Funding: MWK Baden Württemberg

LAB members

Dr. Theresa Buck, Postdoctoral student
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