



University of Stuttgart

Stuttgart Research Center Systems Biology (SRC SB)



Systems Biology Seminar Talk

Cell-free systems for the generation and characterization of membrane proteins, glycoproteins and novel antibody formats

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Lecture Hall 0.106
Allmandring 31
Stuttgart

Abstract:

Membrane proteins, glycoproteins and novel antibody formats have become an important focus in the current efforts in structural and functional analysis. Cell-free protein expression systems, in particular those of eukaryotic origin, have recently been developed as promising tools for the rapid and efficient production of a wide variety of proteins. A huge number of these proteins, however, require posttranslational modifications for optimum function. Several membrane proteins have been expressed *in vivo* to date, most of them being functionally, antigenically, and immunogenically similar to their authentic counterparts. This is mainly due to the properties of cultured eukaryotic cells, which carry out many types of posttranslational modifications such as the addition of N- and O-linked oligosaccharides, but also palmitoylation, myristylation, and phosphorylation. Based on these versatile properties of cultured cell lines, we have developed a technique for the standardized production of translationally active eukaryotic lysates from insect cells and CHO cells. In contrast to other cell-free protein synthesis systems our homogenization procedure avoids any serious breakdown of membrane vesicles already existing in the cytoplasm of the prepared eukaryotic cells. We have demonstrated the functional integrity of these subcellular components by showing signal peptide cleavage as well as glycosylation in cell-free systems. Moreover, we have expanded our cell-free protein synthesis system by the insertion of orthogonal tRNA/synthetase pairs to facilitate the cotranslational and site directed incorporation of non-canonical building blocks. These fluorescently labeled and chemoselective moieties enable the site-specific modification of *de novo* synthesized antibodies, membrane proteins and glycoproteins.

CV:

since 2023: CEO B4 PharmaTech GmbH
since 2015: Chairman Glyconet Berlin Brandenburg
since 2007: Lecturer at the FU & TU, University of Applied Sciences, Berlin and University of Potsdam
2014 – 2022: Department head, “Cell-free and Cell-based Bioproduction”, Fraunhofer-Institute, Potsdam
2010 - 2013: Group leader “Cell-free Protein synthesis and bioproduction”, Fraunhofer-Institute, Potsdam
2000 - 2009: Group leader “Cell-free eukaryotic protein synthesis systems, RiNA GmbH (start-up) at FU Berlin
1998 - 2000: Postdoc, Institute of Pharmacology, FU Berlin
1994 - 1997: PhD, Institute of Physiology, University of Hohenheim