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Nano- and chromobodies: How to connect biochemistry and cell biology

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There is a continual need in biomedical research for reliable binding molecules that recognize cellular targets with high affinity and specificity. Single-domain antibodies - referred to as nanobodies - have emerged as an attractive alternative to traditional antibodies and became highly valuable tools for numerous bio-analytical and biotechnical applications. Recently we have identified novel nanobodies for protein purification, protein-protein interaction analysis, crystallization studies and mass spectrometry approaches. For *in cellulo* studies we developed a novel format of intracellular functional nanobodies (chromobodies) to target and trace endogenous components in living cells. In combination with high-throughput microscopy and automated image analysis we applied chromobodies as intracellular biosensors for phenotypic screening and high-content imaging (HCI) in real time. To date chromobody-based cellular models have been established to monitor cell cycle, signal transduction or to trace epithelial mesenchymal transition upon compound treatment within living cells. Due to their extraordinary properties nano- and chromobodies are versatile binding molecules offering a unique opportunity to combine biochemical, microscopic and functional analyses of cellular targets in flexible settings.

Biography

Ulrich Rothbauer is working on new technologies to study proteins and protein interactions in living cells. His main focus lies on the development of disease relevant assays and target specific nanoprobe for high content analysis based on the chromobody-technology. He has studied Biology at the Ludwig-Maximilian University (LMU). He received his PhD in Biochemistry in the group of Prof. Walter Neupert revealing the pathomechanism of a mitochondrial disease in 2003. After his Postdoctoral work on the regulation of the epigenetic key factors he became an independent group leader at the LMU-Biocenter in 2006. As a Junior Group Leader he directed R&D projects in a range of cellular diagnostic areas including cell cycle studies, apoptosis studies, proteomics and protein-protein interactions. In 2008, he founded the biotech spin-off company ChromoTek, which develops and commercializes new technologies to perform cellular diagnostics and proteomics. In 2011, he became Full Professor for Pharmaceutical Biotechnology at the University Tübingen, Germany.

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