MOLECULAR SCIENCES
biochemie chemie pharmazie

Research Internship

GOETHE UNIVERSITÄT FRANKFURT AM MAIN

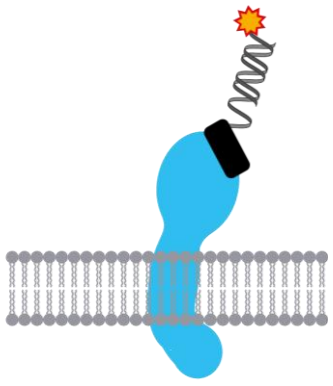
Single-Particle Tracking using DNA-labeled nanobodies

Motivation

Receptor tyrosine kinases (RTKs) are transmembrane receptors, which dynamics are involved in a series of cellular processes, and control a wide range of complex biological functions. Single-molecule studies have provided important new insights into the biology of RTK during recent years. The HER2 receptor as RTK e.g. plays a major role in cancer. Remarkably, the conformation of the extracellular region of HER2 without any bound ligand is similar to the activated conformation of other RTKs in the presence of bound ligands, but there is no known ligand binding to HER2. Yet, it can activate signaling pathways by heterodimerization with other receptors of the family. By now, there is not much known about the activation pattern and dynamics of HER2.

Task Description

Establish single particle tracking of the receptor tyrosine kinase HER2 using an anti-HER2 nanobody and reversible binding of fluorophore-labeled oligonucleotides. Thereforesingle particle tracking of the MET receptor using $InlB_{321}$-Cy3B according to Harwardt et al. (2017) will be performed to get to know the technique. Afterwards, single particle tracking of the HER2 receptor using an oligonucleotide-labeled HER2 nanobody and fluorophore-labeled complementary oligonucleotides will be established. The diffusion behavior of HER2 is going to be characterized under various conditions (resting, stimulated) and data analysis parameters are going to be optimized.



Key References

1. Chapter on ErbB2 in Wheeler & Yarden (Eds.) (2015) Receptor tyrosine kinases: Family and subfamilies.
2. Sibarita (2014) Histochem Cell Biol 141, 587-595.
3. Harwardt et al. (2020) Int J Mol Sci 21, 2803.
4. Harwardt et al. (2017) FEBS Open Bio 9, 1422.

Work Area

Laboratory	■ ■ □ □ □
Microscopy	■ ■ ■ ■ □
Data Analysis	■ ■ ■ ■ □
Programming	■ □ □ □ □

Time

Possible Start

August 2020

Duration

4 weeks

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Language