



## Bioinspired nanoscale drug delivery systems for efficient targeting and safe in vivo application

Principle investigators: Prof. Jörg Huwyler (Department of Pharmaceutical Sciences) and Prof. Cornelia G. Palivan (Department of Chemistry)

An inherent problem in the development of smart diagnostic and therapeutic molecules is the optimization of their physico-chemical properties to achieve a target specific tissue distribution in vivo.

We have therefore invested substantial efforts in designing nanometer sized drug carriers based on lipidic or polymer nano assemblies. They are specifically functionalized for targeting approaches and loaded with active compounds for drug delivery or diagnosis in specific disease-conditions.

The overall aim of this project is to produce cell derived plasma membrane vesicles (PMVs) and modify their composition “on demand” by simultaneous integration of active compounds (therapeutic and/or diagnostic agents) and synthetic copolymers. It will result in a completely new generation of hybrid systems.

These custom designed nano-PMVs (nPMVs) are suitable for potential translation into clinical applications. They are prepared from micro-sized PMVs as we have reported previously for the development of artificial cells. The surface of these nPMVs are covalently modified to provide stability and extended in vivo circulation times in addition to high loading efficiency and a targeting potential of specific tissues. nPMVs will be tested in vitro in tissue-culture models and finally, in vivo in vertebrate animal models systems (i.e. zebrafish, rat).

### Recommended further reading and references:

1. A. Wicki, D. Witzigmann, Balasubramanian V, Huwyler J, *J Control Release*, 2015, 200,138-57
2. A. Najer, D. Wu, D. Vasquez, C.G. Palivan, W. Meier, *Nanomedicine*, 2013, 8(3), 425-44.
3. C.G. Palivan, R. Goers, A. Najer, X. Zhang, W. Meier, *Chem. Soc. Rev.*, 2016, 45, 377-411.
4. T. Einfalt, D. Witzigmann, C. Edlinger, S. Sieber, R. Goers, A. Najer, M. Spulber, O. Onaca-Fischer, J. Huwyler, C. G. Palivan, *Nature Comm*, 2018, DOI: 10.1038/s41467-018-03560-x.