Abstract ID : **59**

Translocation of alternating amphiphilic polymers through lipid membranes

Content

Translocation of biologically active macromolecules through the cell membrane is of vital importance in biological processes and medicine. We found that non-ionic alternating amphiphilic polymers (AAP) made of polyethylene glycol (PEG) as a hydrophilic part and dicarboxylic acids as the hydrophobic part can passively translocate through phospholipid membranes and are able to carry hydrophobic molecules. We studied the translocation process by time-evolution Pulse Field Gradient NMR using large unilamellar vesicles (LUV) as model membrane. Its restricted inner volume allows to access independently adsorption and desorption, as well as the concentration of the translocating species in the membrane. We observe a fast AAP membrane saturation in conjunction with a slow release process. The concentration of the AAP in water and in the membrane is roughly the same. The translocation time can be varied from minutes to many hours adjusting amphiphilicity and molecular weight of AAP. The ability to carry a hydrophobic molecule in water and through the translocation process was shown by fluorescent microscopy. In order to understand the interaction of the polymers with the lipid membrane, we performed neutron reflectometry experiment using deuterated lipids. The first measurements show that the polymers associated with the membrane are located mainly in its hydrophobic interior, which supports the passive character of translocation. As the AAP do not damage the membranes, are biodegradable and non-toxic for living cells they are interesting macromolecules for biological applications.

Primary author(s) : KOSTYURINA, Ekaterina (Forschungszentrum Juelich); Dr. ALLGAIER, Jürgen (Forschungszentrum Jülich); Dr. BIEHL, Ralf (Forschungszentrum Jülich); Dr. KRUTEVA, Margarita (Forschungszentrum Jülich); Dr. FRIELINGHAUS, Henrich (Forschungszentrum Jülich); KOUTSIOUMPAS, Alexandros (Jülich Centre for Neutron Science at Heinz Maier-Leibnitz Zentrum); Dr. DARWISH, Tamim (ANSTO); Dr. YEPURI, Nageshwar Rao (ANSTO); Prof. FÖRSTER, Stephan (Forschungszentrum Jülich)

Presenter(s) : KOSTYURINA, Ekaterina (Forschungszentrum Juelich)

Submitted by **KOSTYURINA, Ekaterina** on **Wednesday 30 March 2022**