Complementarity of neutrons and synchrotron radiation for the study of cell membranes

G.Fragneto

Affiliation: European Spallation Source ERIC, Partikelgatan 2, SE-22484 Lund, **giovanna.fragneto@ess.eu**

The understanding of the function of cellular membranes requires the study of their structure and dynamics. Cellular membranes are complex assemblies of lipids and proteins. In particular, the lipid scaffold is composed by a large variety of lipid species and levels of chain unsaturation, often difficult to synthesise chemically. Because of this complexity, model membrane systems from simple lipid bilayers are often used for fundamental studies and those can profit from probes able to access different scales of size and time like thermal neutrons and synchrotron radiation. Since the pioneering neutron scattering work in the seventies on cell membrane structure, developments driven by constantly improving neutron instrumentation, coupled with development of measurement and analysis methods, have involved both the optimisation of samples towards more biologically relevant model systems including the use of more and more complex lipid mixtures up to natural extracts.
Here, we will focus on developments made in the last decades at the Institut Laue-Langevin in Grenoble, F, on developing model membrane systems and their use in interaction with different proteins, as well as the complementary studies with synchrotron radiation.
These will comprise the development of advanced models of biological membranes [1,2] including systems with hydrogenous and deuterated natural glycerophospholipid mixtures and their study with neutron and synchrotron radiation scattering techniques.

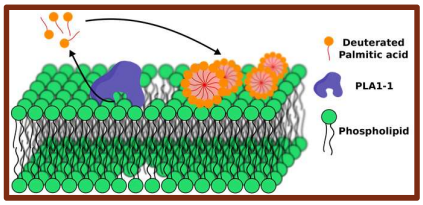

Figure 1: Cartoon of interaction of a phospholipase with lipid bilayers [3].

References

[1] G. Corucci, J. Coll. Int. Sci. (2023)
[2] Muckina et al. J. Coll. Int. Sci. (2021)
[3] G. Corucci PhD Thesis, UGA and ILL (2023)