Interactions of Flavonoids with Biomimetic Membranes

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Over the past decades awareness of the health benefits of phenolic compounds has been constantly growing, but at the same time their detailed function is still scarcely understood. Flavonoids are a subgroup of polyphenols consisting of two phenyl rings and one heterocyclic group that have shown anticancer and antibacterial activity, reducing of oxidative stress and show anticancer activity in vitro systems. However, very often their function *in vivo* is limited due to their reduced bioavailability [1]. In this respect, the mechanisms of interaction of polyphenols with cell membranes are very important to study in order to understand their cellular uptake and function as antibacterial or antioxidant agents. In a molecular dynamics simulation study polyphenols from the procyanidin family adsorb at the surface and poorly incorporate within the hydrophobic core of the membrane bilayer [2, 3]. There seems to be strong correlation between the way molecules incorporate into biomimetic membranes, their influence on membrane fluidity and their functionality, as for instance in demonstrated on antibacterial compounds [4]. Although various investigations have been carried out on the interactions of polyphenols with lipid membranes [1], interactions have been scarcely studied by scattering methods to investigate the incorporation of polyphenols into membranes at the molecular level.

In this contribution, we will focus on our very recent studies on the interactions of different flavonoids with biomimetic membranes by X-ray scattering methods. The most advanced analysis approaches that have been applied to identify the changes in membrane structures, determine the location of molecules within the membrane and detect changes in membrane fluidity, will be discussed. Eventually, we will briefly demonstrate how these molecular scale studies are associated with the biological activity of flavonoids obtained from bioavailability studies *in-vitro*.

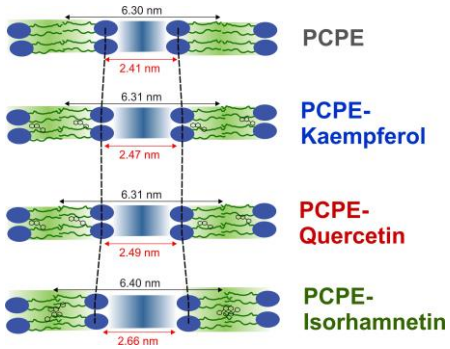

Figure 1 Schematic representation of different flavonoids incorporation into the POPC/POPE bilayers deduced from small angle X-ray scattering data.

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