Membrane structure-modifying lipids: Effect of plant triterpenes on the structural properties of PC model membranes

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Olive oil triterpenes are part of the human Mediterranean diet. Molecular studies have been directed to understand the mechanism of their biological effects. They have cytoprotective effects on healthy cells, beneficial effects on Hypertension’s disease and, in addition, some triterpenes such as oleanolic and ursolic acid, have been shown to induce differentiation and apoptosis of tumor cells. Their biological activity has been related to the interaction with the cell membrane and their regulating effect of the activity and/or expression of enzymatic systems implicated in relevant physiological processes [1].

The aim of our study is to analyze the interaction of several triterpenes obtained from olive plant with model membranes of different lipid composition. For X-ray diffraction experiments, multilamellar lipid vesicles of 1,2-dielaidoyl-sn-glycero-3-phosphatidylethanolamine (DEPE) and 1,2-dipalmitoyl-sn-glycero-3-phosphatidylcholine (DPPC) 15% (w/w) in presence and absence of triterpenes were prepared in 10 mM Hepes, 100mM NaCl, 1mM EDTA, pH 7.4. Measurements were performed at the A2 beamline at DESY-HASYLAB. Experimental data indicate a differential modulation of DPPC membranes related to the structural properties of the triterpene compound (Fig. 1). Further investigations are in progress.

Figure 1: X-ray diffraction pattern of DPPC membranes in absence (A) and in presence of oleanolic (B) and ursolic acid (C) at a molar ratio 50:1 (lipid: triterpene). The sequence of patterns was acquired with a scan rate of 1°C/min. Successive diffraction patterns were collected for 15 s every minute.

References