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BLM23_Changes in biophysical properties of membranes containing sphingomyelin with very long chain PUFA induced by its hydrolysis

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Very long-chain (C24 to C36) polyunsaturated fatty acids (VLCPUFA) are important acyl groups of sphingomyelin (SM) and ceramide (Cer) of mammalian spermatozoa. In rat sperm, SM species containing PUFA with 28-32 carbon atoms are exclusively located on the heads. After inducing the acrosomal reaction almost complete hydrolysis such SMs occurs, leading to gametes considerably enriched in the corresponding Cer species. The aim of this study was to evaluate the effects of the sphingomyelinase-induced conversion VLCPUFA-SM → VLCPUFA-Cer on the biophysical properties of a binary model system (POPC/SM). The VLCPUFA-containing molecular species of SM were isolated from rat testes by a combination of chromatographic techniques. Egg-SM, whose properties are widely known, was used for comparison. Unilamellar liposomes (LUVs) were prepared and Dynamic Light Scattering was used to evaluate their structures/sizes before and after enzymatic hydrolysis. The potential increase in the interaction between different populations of liposomes (fission/fusion) after the SM → Cer hydrolysis was evaluated by FRET assays using NBD-PE as donor and Rh-PE as acceptor, and the lateral segregation of phases after Cer generation was followed by anisotropy of different fluorescence probes (laurdan, DPH and NBD-PE). In all biophysical properties measured, the SM species containing VLCPUFA contrasted with those of the egg-derived saturated SM. The longer and bulkier acyl chains of VLCPUFA-Cer may play a role in favouring the fusion/fission events that occur in the head of spermatozoa during the acrosomal reaction, a process that requires topological lipid intermediates with negative curvature.

BLM24_Surface activity of L- ascorbic acid derivatives

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L-ascorbic acid derivatives are molecules of potential pharmacological interest (as well as alimentary and cosmetic) due to its antioxidant properties and amphiphilic nature.

These vitamin C derivatives (ASC_n, n= 10, 12, 14) were synthesized according to a modified method of the main procedure already reported in literature [1] and were compared with the commercial derivative ASC₁₆. These molecules were characterized through ¹H ¹³C NMR and IR, showing stability during three weeks.

We found that, contrary to ASC₁₀ and ASC₁₂, ASC_n with n= 14 and 16 form stable Langmuir monolayers at room temperature. ASC₁₆ films show phase transition from a liquid-expanded (LE) to a liquid-condensed (LC) or crystalline phase, whereas the other derivatives presents only a LE phase.

All these compounds have a complex surface behavior and display a favorable penetration into phospholipid monolayers with strong interaction among them.

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