

Abstract Submitted
for the NWS09 Meeting of
The American Physical Society

The Physical Properties of Sphingomyelin/Cholesterol Membranes: a Deuterium NMR Study AMIRMOHAMAD KEYVANLOO, MEHRAN SHAGHAGHI, MARTIN ZUCKERMANN, JENIFER THEWALT — We have used ^2H NMR to study the effect of cholesterol on N-palmitoyl(D31)-D-erythro-sphingosylphosphorylcholine (PSM) membranes. NMR spectra were taken as a function of temperature and cholesterol concentration. The constructed phase diagram exhibits both solid-ordered (**so**) + liquid-ordered (**lo**) and liquid-disordered (**ld**) + **lo** phase coexistence regions with a clear three-phase line at 37°C . The **ld** + **lo** region was characterized by examining the cholesterol dependence of the width of resolved peaks in the depaked spectra, as well as the average spectral width (M_1), at a given temperature. The **so** + **lo** region was defined using spectral subtraction. Analogous experiments were done using 1-palmitoyl,2-palmitoyl(D31)-*sn*-glycero-3-phosphocholine (DPPC)/cholesterol membranes in order to carefully compare the data obtained using palmitoyl chains which have similar “kinked” conformations. The three-phase line in *sn*-2 perdeuterated DPPC/cholesterol is at 39°C . The PSM/cholesterol membrane is significantly more ordered than the DPPC/cholesterol membrane in the liquid crystalline phase. This should be compared to the difference between the cholesterol-free membranes at, where the average order of PSM is more than that of DPPC.

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Date submitted: 20 Apr 2009

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