

Cholesterol preferentially forms microdomains with saturated phospholipids (*e.g.*, sphingomyelin (SM)) in lipid bilayers. The majority of studies utilize cholesterol concentrations (>30 %) necessary to form liquid-ordered states in ternary systems. To determine the effects of cholesterol on sphingomyelin alone, the SM/Chol binary system was examined using ^{31}P MAS and static NMR. The temperature dependent ^{31}P MAS NMR spectral line widths detect a pre-transition (~ 300 K) for SM and SM/5% Chol before the main transition ($T_m \sim 312$ K). This pre-transition is reduced/eliminated as the cholesterol content approaches 10%. Interestingly, the static ^{31}P NMR data indicate an increased magnetic alignment of SM with increased cholesterol content. These and other results will be discussed, providing a more detailed look at the changes cholesterol has on the local structural/dynamic properties of SM containing membranes. *Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.*