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Cholesterol influences PRODAN partitioning between phospholipid phases and water.

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**Cholesterol influences PRODAN partitioning between phospholipid phases and water.**

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**Abstract**

The effect of cholesterol on the packing and polarity of bilayers has been studied by the fluorescent probe 6-propionyl-2-dimethylaminonaphthalene (PRODAN), a probe located at the membrane surface. In the gel phospholipid phase and in the absence of cholesterol, PRODAN's phospholipid:water partition coefficient has been spectroscopically determined using the fluorescence intensities at three emission wavelengths and was about  $14 \times 10^4$ . In the liquid-crystalline phase of the bilayer this value was about  $500 \times 10^4$  (Krasnowska et al., *Biophys. J.*, 1998, 74:1984). PRODAN fluorescence emission from the aqueous environment was monitored by the appearance of a red emission band centered at 520 nm. When cholesterol was added to phospholipid gel phase bilayer, at concentrations  $>3\text{mol}\%$ , the red emission band centered at 520 nm disappeared and the PRODAN partition coefficient was similar to that determined for liquid-crystalline phase bilayers. We attributed this effect to cholesterol-induced looser interactions between adjacent phospholipid polar head groups that allowed a better penetration of PRODAN molecules into the membrane. In gel phase bilayers, the PRODAN partition coefficient was a function of cholesterol concentration. By increasing cholesterol concentration the probe partitioning in the bilayer showed a linear and relevant increase, up to 10 mol% cholesterol. At higher cholesterol concentrations, the probe partition coefficient was about constant up to 30 mol%. PRODAN's spectral features were also used to monitor small variations occurring in the packing of the bilayer surface for fine variations of cholesterol concentration, from 20 to 30 mol%, with 1 mol% steps. Due to PRODAN's higher sensitivity ... [truncated at 250 words]