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## Comparative study of the interaction of CHAPS and Triton X-100 with the erythrocyte membrane.

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### Abstract

The zwitterionic detergent CHAPS, a derivative of the bile salts, is widely used in membrane protein solubilization. It is a “facial” detergent, having a hydrophilic side and a hydrophobic back. The objective of this work is to characterize the interaction of CHAPS with a cell membrane. To this aim, erythrocytes were incubated with a wide range of detergent concentrations in order to determine CHAPS partition behavior, and its effects on membrane lipid order, hemolytic effects, and the solubilization of membrane phospholipids and cholesterol. The results were compared with those obtained with the non ionic detergent Triton X-100. It was found that CHAPS has a low affinity for the erythrocyte membrane (partition coefficient  $K = 0.06 \text{ mM}^{-1}$ ), and at sub-hemolytic concentrations it causes little effect on membrane lipid order. CHAPS hemolysis and phospholipid solubilization are closely correlated. On the other side, binding of Triton X-100 disorders the membrane at all levels, and has independent mechanisms for hemolysis and solubilization. Differential behavior was observed in the solubilization of phospholipids and cholesterol. Thus, the detergent resistant membranes (DRM) obtained with the two detergents will have different composition. The behaviors of the two detergents are related to the differences in their molecular structures, suggesting that CHAPS does not penetrate the lipid bilayer but binds in a flat position on the erythrocyte surface, both in intact and cholesterol depleted erythrocytes. A relevant result for Triton X-100 is that hemolysis is not directly correlated with the solubilization of membrane lipids, as it is usually assumed.

**Keywords:** detergents, membrane/water partition, spin label EPR, hemolysis, cholesterol depletion, DRM.

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