

## **CHAPTER 14. TECHNIQUES AND METHODS FOR STUDY OF BIOLOGICAL MEMBRANES: DETERGENTS AND MODEL SYSTEMS**

A better elucidation of molecular mechanisms underlying drug-membrane interaction is of great importance for drug research and development. To date, different biochemical and biophysical methods have been developed to study biological membranes at molecular level. We focus on the recent applications and achievements of modern analytical techniques in the study of drug interactions with lipid membranes, including chromatography, spectrometry, calorimetry, and acoustic sensing. Moreover, various types of biomimetic model membranes including liposomes, lipid monolayers, and supported lipid monolayers/bilayers are described.

### **Membrane Proteins, Lipids and Detergent**

Detergents are a class of molecules whose unique properties enable manipulation (disruption or formation) of hydrophobic–hydrophilic interactions among molecules in biological samples. In biological research, detergents are used to lyse cells (release soluble proteins), solubilize membrane proteins and lipids, control protein crystallization, prevent nonspecific binding in affinity purification and immunoassay procedures, and are used as additives in electrophoresis

Detergents play an essential role in the extraction, purification, and manipulation of membrane proteins; their amphiphilic nature allows them to interact with hydrophobic membrane proteins to keep them water-soluble outside of their native bilayer environment. Unfortunately, solubility does not always translate to native structure and stability; a detergent that is useful for extraction may not be compatible with purification and/ or biochemical studies. Furthermore, a detergent that works for one membrane protein may not be suitable for a different membrane protein. While there is not a set of “golden rules” for the uses of detergents for membrane protein applications, understanding the physical-chemical properties associated with different classes of detergents may be useful for deciding which detergent may work best for a particular application.