



## FOREWORD

# Glycosphingolipids and membrane domains

Sandro Sonnino and Guido Tettamanti (Guest Editors)

*Department of Medical Chemistry and Biochemistry - LITA-Segrate, University of Milan, Italy*

The pioneering work of S.J. Singer and G.L. Nicholson [(1972) *Science* 75, 720–31] on biological membranes predicted the existence of domains, i.e., of zones where the concentration of the components differs from the surrounding membrane environment. This prediction implied the possibility that different types of domain could exist, having different patterns of component molecules, and perhaps even coexisting within the same membrane. Several investigations, using either artificial or cellular models and a variety of techniques, confirmed this hypothesis, suggesting that organization in domains is a common feature of biological membranes. Currently, it is generally accepted that macro- and micro-domains exist within the plane of the membrane, where the pattern of molecules and the physico-chemical properties are distinct from the environment.

Sphingolipid enriched membrane domains, within membrane domains, due to their enrichment of proteins related to signal transduction, sorting, cellular transport processes, cell adhesion, cell growth and apoptosis, particularly attracted the attention of investigators in recent years. Thus, a survey in the Medline database within the period 1997–2000 showed that articles that focus on sphingolipids and domains are only 5% of the total articles related to sphingolipids, but are 50% of those available in the period 1966–2000.

One of the most interesting features displayed by the sphingolipid enriched membrane domains is their peculiar glycolipid enrichment. Thus, very often these domains are described as glyco-domains or glyco-signaling domains. This

explains the great interest shown by the Glycobiologists to develop studies on glycolipids and membrane domains, as testified by the recent high number of papers in this field.

Glycolipids, or more precisely glycosphingolipids, are typical components of the plasma membrane of vertebrate cells, and their ability to concentrate in discrete zones of the membrane has been known for a long time. Nevertheless, the mechanism of glyco-domain formation (biogenesis), the mechanisms for the recruitment of lipid species and of specific proteins, the mechanism of associations between glycosphingolipids and proteins, as well as the functional role played by glyco-domains, have been only partially investigated. Many aspects of this field of research remain obscure and require further intensive investigations.

This issue of the *Glycoconjugate Journal*, presents review articles that discuss the role of glyco-domains in signal transduction, cell adhesion, cell recognition, cell trafficking and lipid/protein membrane sorting, and aims to give the reader an overview on the state of the art in this field of research. We have also a few original articles that show new and biotechnological approaches that are available for the study of glyco-domains.

In our mind this special issue of *Glycoconjugate Journal* on ‘Glycosphingolipids and Membrane Domains’ would be of interest to scientists who would like to begin glycobiology research, and to glycobiologists who would simply like to know ‘what’s the news’ on glyco-domains.