
Preface

The history of lipids spans almost four centuries, ever since Techenius Otto suggested the presence of acidic compound in fat in 1673 (fatty acids: Otto found that the alkali is neutralized by animal fat in the process of making soap). Lipids are the biomolecules that provide boundary to cells. They are also highly efficient signaling molecules. Every fragment generated from a lipid can be used for differential signaling in a living cell. Indeed, all major journals with biological chemistry mandate have a dedicated section for lipid biochemistry and signaling. Despite a rich history of lipid research that includes perspectives from fundamental biology and synthetic organic chemistry, the lipids are not a dominant theme in most biological laboratories. Only about a 10th or less of the laboratories engaged in biomedical research focus on lipid biochemistry. This is also partly due to the lack of easily available reagents and otherwise due to the lack of awareness about tools, techniques, and knowledge of protocols. For example, antibodies to most lipids are neither available nor could be easily generated. However, in the last five years alone, there have been tremendous advancements in lipid identification and quantification methods. This includes major advancements in mass spectrometric and bioinformatic methods towards identification and quantification of lipids. There have also been tremendous advancements in other techniques as well as in generating mice models with specific alterations in lipid metabolizing enzymes. A wealth of clones of different enzymes and lipid handling proteins also have been accumulated over a number of years. This book presents an account of areas of utility, techniques, and bioinformatic advancements. We expect this issue of the Methods in Molecular Biology series to be useful to Biochemists, Molecular Biologists, and Neuroscientists with interest in Neurology, Ophthalmology, and Vision Science as well as Mass spectrometrists with interest in disease discovery. This issue includes protocols for lipid isolation for extractive as well as imaging mass spectrometry. The latter helps in localization of lipids in tissues and is expected to address issues such as pathologic deposits and fluorescence in correct cellular layers within the tissue. The protocols also include isolation of specific membranes and specialized fractionation of subcellular compartments. A number of different high-throughput mass spectrometric approaches, databases, and bioinformatic analyses methods are included in protocols. These protocols have been complemented by utilization of methods in specific problems from fractionated organelles, cells to whole organism. A few protocols have dealt with computational and functional analysis of lipid metabolizing enzymes while others about their interaction with proteins including an electrochemical method. It is hoped that these protocols will come handy in the investigation of biological questions in many biomedical research laboratories in ensuing future.

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