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EDITORIAL

Regulation of lipid metabolism

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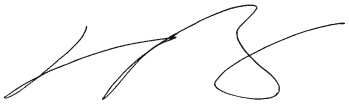
Lipids including cholesterol, phospholipids, fatty acids and triacylglycerols are important cellular constituents involved in membrane structure, energy homeostasis and many biological processes such as signal transduction, organelle development and cell differentiation. Recently, the area of lipid metabolism has drawn a great deal of attention due to its emerging role in the development of metabolic disorders such as obesity, diabetes, atherosclerosis and liver steatosis. We decided to organize a special issue of *Frontiers in Biology* focusing on our current understanding of lipid metabolism.

Regulation of lipid metabolism in eukaryotic cells takes place at multiple steps, including lipid synthesis, trafficking, and storage. In this issue, Carman and Chang et al. give an overview of the identification, biochemical activity and physiological roles of two important classes of proteins: phosphatidic acid phosphatases and membrane-bound *O*-acyltransferases (MBOATs) in controlling lipid synthesis. Shui covers basic strategies to systematically identify lipid metabolites or important signaling lipid(s), emphasizing on the MS-based lipidomics approaches in combination with computational tools/softwares (chemometrics). Du and Yang summarize the role of sterol-binding proteins in endosomal cholesterol transport. Furthermore, Grillitsch and Daum describe the biochemical, molecular and cell biological information of yeast triacylglycerol lipases in the dynamic formation of lipid droplets and lipid storage therein, and lipid mobilization. Abnormal lipid metabolism often results in the development of metabolic disorders such as obesity and diabetes. He et al. present the interrelationship between obesity and breast cancer development in postmenopausal women and discuss the cross-talk of leptin and estrogen signaling pathways. Xu and Zhao summarize an emerging area of metabolic regulation by a posttranslational modification: lysine acetylation of a variety of metabolic enzymes and their potential physiological significance. Due to the diversity and complexity of the cellular lipids, identification and characterization of individual lipids under various physiological and pathological conditions necessitate new techniques. Finally, Gelissen and Brown give us a brief history and recent development of anti-cholesterol therapies with a particular focus on pharmacological interventions on cholesterol biosynthetic pathway and novel targets.

Overall, these eight articles present the most exciting and emerging areas of regulation of lipid metabolism, spanning from basic research to technological innovation and therapeutical intervention of metabolic diseases. We are convinced that research in lipid metabolism will attract many more young talents, which will be invaluable for tackling the prevalent metabolic diseases inflicting on a large population. We greatly appreciate the contribution of all the authors for this special issue.



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