# An introduction to the *Journal of Lipid Research* Thematic Series on lysophospholipids

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It is a pleasure to introduce the latest JLR Thematic Series that will review the field of lysophospholipids through a set of six reviews written by authoritative members of this field. These reviews will introduce key concepts and update selected areas within this growing field, particularly in those areas that have had significant scientific and/or medical impact. While not all areas of lysophospholipid biology are discussed in this thematic series, these areas are at least tangentially touched upon within the six reviews. The interested reader may delve more deeply through the primary literature cited within the reviews in topics such as the enzymology of degradative pathways, nonvertebrate metabolism and activities, and possible nonreceptor actions of lysophospholipids that have appeared in the literature and await confirmation.

Lysophospholipids are commonly produced from large pools of phospholipids that make up the cell membrane's lipid bilayer. Membrane phospholipids can be generally divided into two major classes: glycerophospholipds and sphingolipids. The former includes molecules like phosphatidylcholine, which can be enzymatically metabolized to give rise to a diverse range of hundreds of chemical species, including lysophosphatidic acid (LPA). Complementing these glycerophospholipids are the sphingolipids, particularly sphingomyelin, which are characterized by containing the constituent lipid sphingosine. Sphingosine can be released from sphingolipids through enzymatic steps and phosphorylated to produce sphingosine 1-phosphate (S1P).

Through the mid-1990s, these lipids were more commonly treated as members of distinct, nonoverlapping fields with limited biological and medicinal commonality or relevance. However, once LPA and S1P cell surface receptors were identified and found to share significant homology as members of a common family, the lysophospholipid field coalesced, allowing synergistic progression. Currently, this field includes thousands of publications touching on a vast range of science, spanning fundamental chemistry through organismal development and approved medical therapeutics.

The series begins with a review on glycerophospholipid metabolism and function from Takao Shimizu's group at the University of Tokyo and The National Center for Global Health and Medicine entitled "Diversity and function of membrane glycerophospholipids generated by the remodeling pathway in mammalian cells." This review covers important aspects in the generation of bioactive lipids like LPA from the cell membrane. In the next month, we will continue an examination of glycerophospholipid derivatives through a major biosynthetic enzyme for LPA called autotaxin (ENPP2), a lysophopholipase D that can remove choline from lysophosphatidylcholine to produce LPA. This important enzyme is reviewed by Wouter Moolenaar's group from the Netherlands Cancer Institute, in "Autotaxin: structure-function and signaling." The next topic to be covered will be from my group (Jerold Chun, series coordinator, The Scripps Research Institute) that updates studies on LPA receptors in a piece entitled "LPA receptor signaling: pharmacology, physiology, and pathophysiology." As we move through the summer months, our series will continue on the topic of S1P receptors from Timothy Hla's group at Cornell Weill Medical School through a contribution entitled "An update on the biology of sphingosine 1-phosphate receptors." Continuing with new insights into S1P and its potential for cancer therapeutics, Sarah Spiegel's group at Virginia Commonwealth University contributes a review entitled "Export of sphingosine 1-phosphate and cancer progression." Our final contribution for this JLR Thematic Series reports on new lysophospholipid receptors from Junken Aoki's group at Tohoku University through recent studies on novel receptors for other species of glycerphospholipid-derived lysophospholipids in a piece entitled "Novel lysophosphoplipid receptors; their structure and function." One additional note on the new receptors is that a codified nomenclature has yet to be finalized, so there may be changes with respect future receptor names.

We are indebted to Mary Chang and her staff for bringing this project to fruition, and the Editors of the JLR, especially Ed Dennis and Joe Wiztum, who suggested the project. On behalf of all of the authors, we hope this series provides an entry point for those new to the field of lysophospholipids, and a useful update for our many colleagues within it and whom we thank profusely for their innumerable contributions to this dynamic and growing field.

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