Signaling and Communication in Plants

Series Editor

František Baluška
Department of Plant Cell Biology, IZMB, University of Bonn, Kirschallee 1,
D-53115 Bonn, Germany

For further volumes:
http://www.springer.com/series/8094

Xuemin Wang
Editor

Phospholipases in Plant Signaling

Springer

Editor
Xuemin Wang
Department of Biology
University of Missouri-St. Louis and Donald
Danforth Plant Science Center
St. Louis
Missouri
USA

ISSN 1867-9048 ISSN 1867-9056 (electronic)
ISBN 978-3-642-42010-8 ISBN 978-3-642-42011-5 (eBook)
DOI 10.1007/978-3-642-42011-5
Springer Heidelberg New York Dordrecht London

Library of Congress Control Number: 2013958085

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

Phospholipases hydrolyze phospholipids. The activities of phospholipases affect not only the structure and stability of cellular membranes but also the production of cellular mediators. The past decades have brought rapid growth in knowledge about the role of phospholipases in signaling processes. This volume reviews and highlights exciting developments in biochemical, molecular, and functional aspects of various phospholipases in plants.

The first half of the book summarizes our current knowledge of six different types of phospholipases, including phospholipase D (PLD; Chap. 1), phosphoinositide-hydrolyzing phospholipase C (PI-PLC; Chap. 2), nonspecific PLC (NPC. Chap. 3), patatin-related phopholipase A (pPLA; Chap. 5), and secretory PLA_2 and PLA_1 (sPLA; Chap. 6). The activity of PLD, PI-PLC, and NPC contribute to the production of phosphatidic acid (PA), which has been identified as a class of lipid mediators (Chap. 4). The second half of the book describes the progress made investigating the role of various phospholipases on plant stress responses, including response to hyperosmotic stresses (Chap. 7), nitrogen and phosphate availability (Chap. 8), NO and oxidative stress (Chap. 9), and plant–pathogen interactions (Chaps. 10 and 11).

From information presented in these chapters, it becomes evident that each family of phospholipases is comprised of multigene-encoding enzymes with overlapping, yet unique functions. Knowledge on the biochemical and functional heterogeneities of these enzymes will be important to understanding the multifaceted functions of phospholipases including cellular regulation, lipid metabolism, and membrane remodeling. Phospholipase-based signaling in plants differs in many aspects from mammalian cells, and considerable gaps in knowledge exist concerning what lipid mediators are produced by a specific phospholipase and how they function in plants. In addition, activation of more than one phospholipase is often involved in a given stress response, and information on the interplay among different phospholipases will help greatly the understanding of phospholipase signaling in plant processes, such as stress responses, cell size, shape, growth, apoptosis, proliferation, and reproduction.

The publication of this book would not have been possible without the efforts of many people to whom I am deeply indebted to. The authors of the individual chapters generously devoted their time and wisdom to ensure the high quality, up to date information presented in this book. My former and current students, postdoctoral associates, and visiting scientists with whom I have had the privilege to work have made numerous contributions to the field and made my editing of the book possible. Brian Fanella read all the chapters and provided valuable editorial suggestions. Also I thank editorial staff of Springer for their professional guidance in the production of this book.

St Louis, MO Xuemin Wang

Contents

Part III Phospholipases in Plant Biotic Interactions