

Phosphoinositides II: The Diverse Biological Functions (Subcellular Biochemistry)

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Phosphoinositides play a major role in cellular signaling and membrane organization. During the last three decades we have learned that enzymes turning over phosphoinositides control vital physiological processes and are involved in the initiation and progression of cancer, inflammation, neurodegenerative, cardiovascular, metabolic disease and more. In two volumes, this book elucidates the crucial mechanisms that control the dynamics of phosphoinositide conversion. Starting out from phosphatidylinositol, a chain of lipid kinases collaborates to generate the oncogenic lipid phosphatidylinositol(3,4,5)-trisphosphate. For every phosphate group added, there are specific lipid kinases – and phosphatases to remove it. Additionally, phospholipases can cleave off the inositol head group and generate poly-phosphoinositols, which act as soluble signals in the cytosol. Volume II extends into the role of phosphoinositides in membrane organization and vesicular traffic. Endocytosis and exocytosis are modulated by phosphoinositides, which determine the fate and activity of integral membrane proteins. Phosphatidylinositol(4,5)-bisphosphate is a prominent flag in the plasma membrane, while phosphatidylinositol-3-phosphate decorates early endosomes. The Golgi apparatus is rich in phosphatidylinositol-4-phosphate, stressed cells increase phosphatidylinositol(3,5)-bisphosphate, and the nucleus has a phosphoinositide metabolism of its own. Phosphoinositide-dependent signaling cascades and the spatial organization of distinct phosphoinositide species are required in organelle function, fission and fusion, membrane channel regulation, cytoskeletal rearrangements, adhesion processes, and thus orchestrate complex cellular responses including growth, proliferation, differentiation, cell motility, and cell polarization.

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Editorial Review

From the Back Cover

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Volume II extends into the role of phosphoinositides in membrane organization and vesicular traffic. Endocytosis and exocytosis are modulated by phosphoinositides, which determine the fate and activity of integral membrane proteins. Phosphatidylinositol(4,5)-bisphosphate is a prominent flag in the plasma membrane, while phosphatidylinositol-3-phosphate decorates early endosomes. The Golgi apparatus is rich in phosphatidylinositol-4-phosphate, stressed cells increase phosphatidylinositol(3,5)-bisphosphate, and the nucleus has a phosphoinositide metabolism of its own. Phosphoinositide-dependent signaling cascades and the spatial organization of distinct phosphoinositide species are required in organelle function, fission and fusion, membrane channel regulation, cytoskeletal rearrangements, adhesion processes, and thus orchestrate complex cellular responses including growth, proliferation, differentiation, cell motility, and cell polarization.

The two volumes on “Phosphoinositides” provide a concise overview of the latest developments in the field of phosphoinositide hemostasis and function, and provide introductory background and extensions into unexplored territory.

Users Review

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Joanne Hall:

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