
Preface

In recent years, lysosomes have emerged from dumpsters of cellular waste materials to key subcellular organelles that regulate the cell function. Many of the essential activities of the cell are now known to be dependent on lysosomes, the dysfunction of which is linked to multiple diseases, such as lysosome storage disorders, neurodegeneration, immunological diseases, and cancer. Experimental approaches to study the lysosomes have also revolutionized, owing to the development and implementation of new technologies and improved understanding of the organizations and biological functions of various subcellular structures. One of the fast-growing areas in lysosome research is the transport of ions and small molecule substances across the lysosomal membrane. There have been many new exciting discoveries in the last few years that deserve attention, especially because of their technological innovation and the new knowledge gained, which have reshaped our thinking about how lysosomes work to impact important functions ranging from macroautophagy, migration, metabolism to viral invasion.

This volume of the CRC series on Methods in Signal Transduction is dedicated to the discussion of concept and methodology used to study lysosome ion and small molecule transport. The ten chapters cover a broad range of topics including the current state-of-the-art experimental approaches to study cation and anion channels localized on the lysosomal membranes, physiological functions of endolysosomal channels in development and disease, the transport of amino acids and vitamins across the lysosomes, the regulation of lysosome permeability and the pigmentation of melanocytes. Detailed protocols are provided for electrophysiological recordings, gene manipulation, cell biological analysis, transmembrane or metabolic flux measurement, subcellular organelle preparation, and large-scale screening. The chapters are intended for both accomplished investigators who want to broaden their views on this important subject and young investigators and trainees who need to acquire comprehensive knowledge and technical skills working with lysosomal ion channels and small molecule transporters. We anticipate this book to be a valuable menu for both basic and clinical scientists.

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