

PREFACE

The identification of hydrogen peroxide in regulation of cell signaling and gene expression was a significant breakthrough in oxygen biology. Hydrogen peroxide is probably the most important redox signaling molecule that, among others, can activate NF κ B, Nrf2, and other universal transcription factors and is involved in the regulation of insulin- and MAPK signaling. These pleiotropic effects of hydrogen peroxide are largely accounted for by changes in the thiol/disulfide status of the cell, an important determinant of the cell's redox status. Moreover, disruption of redox signaling and control recognizes the occurrence of compartmentalized cell redox circuits.

Hydrogen peroxide signaling has been of central importance in cell research for some time and some previous volumes of *Methods in Enzymology* have covered in part some aspects of the physiological roles of hydrogen peroxide. However, there have been new developments and techniques that warrant these three volumes of *Methods in Enzymology*, which were designed to be the premier place for a compendium of hydrogen peroxide detection and delivery methods, microdomain imaging, and determinants of hydrogen peroxide steady-state levels; in addition, the role of hydrogen peroxide in cellular processes entailing redox regulation of cell signaling and transcription was covered by experts in mammalian and plant biochemistry and physiology.

In bringing this volume to fruition credit must be given to the experts in various aspects of hydrogen peroxide signaling research, whose thorough and innovative work is the basis of these three *Methods in Enzymology* volumes. Special thanks to the Advisory Board Members—Christopher J. Chang, So Goo Rhee, and Balyanaraman Kalyanaram—who provided guidance in the selection of topics and contributors. We hope that these volumes would be of help to both new and established investigators in this field.

ENRIQUE CADENAS
LESTER PACKER
May 2013