

PREFACE

Hydrogen sulfide is viewed as the third gasotransmitter, gaseous signaling molecule, together with nitric oxide and carbon monoxide. The cellular sources of hydrogen sulfide involve enzymes of the trans-sulfuration pathway CBS (cystathionine β -synthase), CSE (cystathionine γ -lyase), and 3MST (3-mercaptopyruvate sulfur-transferase). Storages of hydrogen sulfide occur in mitochondria (iron-sulfur clusters of enzymes) and cytosol (bound sulfane sulfur). Of course, the release of hydrogen sulfide from these storages is tightly regulated by several pathophysiological processes.

In addition to the myriad of effects arising from hydrogen sulfide as a signaling molecule, it also protects against oxidative stress and glutamate toxicity, inhibits the release of insulin, preserves mitochondrial function, and is a modulator of inflammatory responses. These pleiotropic effects of hydrogen sulfide have been the subject of numerous investigations in the last years and are largely accounted for by its role as a gaseous signaling molecule. Hydrogen sulfide may act alone or in conjunction with other gasotransmitters and, in doing so, it regulates a number of physiological processes and is involved in some stages of the pathogenesis of several diseases.

These volumes of *Methods in Enzymology* were designed as a compendium for hydrogen sulfide detection methods, the pharmacological activity of hydrogen sulfide donors, the redox biochemistry of hydrogen sulfide and its metabolism in mammalian tissues, the mechanisms inherent in hydrogen sulfide cell signaling and transcriptional pathways, and cell signaling in specific systems, such as cardiovascular and nervous system as well as its function in inflammatory responses. Three chapters are also devoted to hydrogen sulfide in plants and a newcomer, molecular hydrogen, its function as a novel antioxidant.

In bringing these volumes of *Methods in Enzymology* to fruition, credit must be given to the experts in various aspects of hydrogen sulfide research, whose thorough and innovative work is the basis of these *Methods in Enzymology* volumes. We hope that these volumes will be of help to both new and established investigators in the field.

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