PREFACE

The endogenous production and physiological function of many gaseous molecules including, but not limited to, nitric oxide (NO), carbon monoxide (CO), and hydrogen sulfide (H_2S), have been increasingly recognized in recent years. These gaseous molecules, defined as gasotransmitters, share common chemical features and biological action modes, but distinguish themselves from classical neurotransmitters and humoral factors. The concept of gasotransmitters has found its application across a wide spectrum of biological systems. Recent advances in the novel and challenging field of gasotransmitter biology and medicine—encompassing biomedical and clinical issues, health services, and population health studies—are dazzling. Gasotransmitters are important endogenous signaling molecules. Among many cellular and molecular targets of gasotransmitters, membrane ion channels are the key signal transduction link regulated by gasotransmitters. The regulation of ion channels by gasotransmitters can result from the activation of different second messengers or the direct interactions between gasotransmitters and ion channel proteins. The latter is a novel mechanism and has attracted great attention from researchers in every field of biomedical studies.

Many books have been published that focus on neurotransmitters and other classical signal transduction pathways. *Signal Transduction and the Gasotransmitters: NO, CO, and H_2S in Biology and Medicine* reviews the biology and medicine of gasotransmitters with an emphasis on signaling transduction mechanisms in general, and ion channel regulation in particular. Following an account of the historical evolution of the gasotransmitter concept, the endogenous metabolisms of gasotransmitters and their regulation, the comparison of the toxicological profiles and biological actions, and interactions among gasotransmitters in terms of their production and effects are discussed. The physiological roles of NO, CO, and H_2S in the regulation of cardiovascular, neuronal, and gastrointestinal systems, as well as of cell metabolism are reviewed. The interaction of gasotransmitters with K_{Ca} channels, KATP channels, voltage-gated Ca^{2+} channels, voltage-gated Na^+ channels, and cyclic nucleotide-gated ion channels are presented. Included in the array of different mechanisms for the interaction of NO, CO, and H_2S are channel phosphorylation, *S*-nitrosylation, carboxylation, sulfuration, and altered cellular redox status. Guidance and suggestions can be found for exploring and characterizing lesser known gasotransmitters.

Signal Transduction and the Gasotransmitters: NO, CO, and H_2S in Biology and Medicine should serve as a summary and a standard reference source concerning signal transduction mechanisms underlying the physiological functions of gasotransmitters. Clinical scientists and physicians as well as other professional health workers should be excited by the advances in gasotransmitter research described in this book. The authors hope that scientists from both basic biology and health science disciplines find this book useful, interesting, and inspiring.

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