New insight into the role of TST-derived hydrogen sulfide, a key regulator of mesenteric homeostasis in health and during chronic fructose intake

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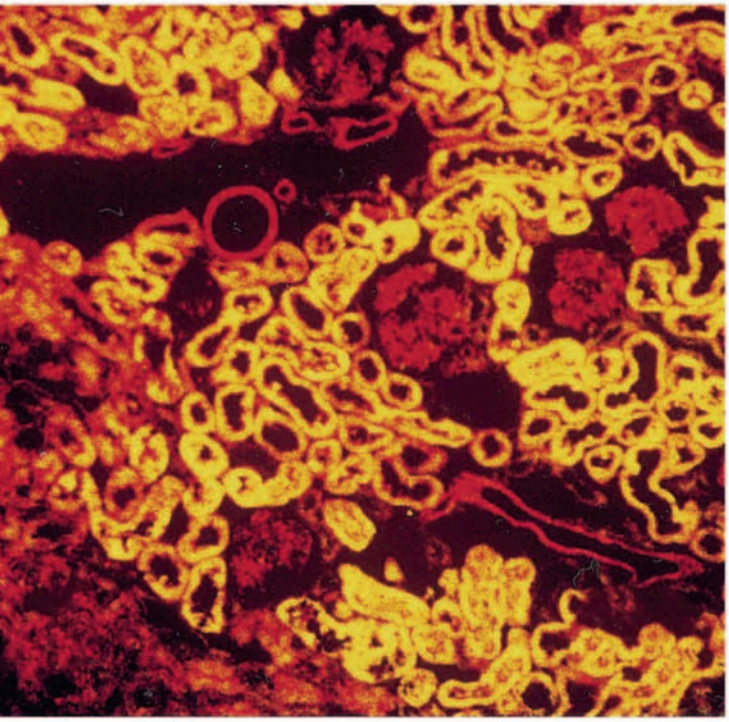

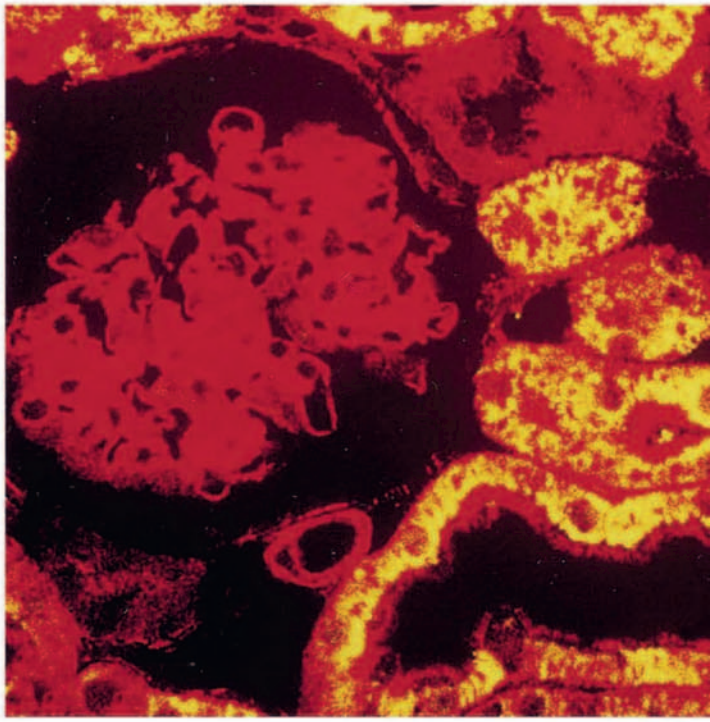

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Preface

This book focuses on "sulfurtransferases," a novel research subject, and tries to shed further light on why these enzymes are essential for life. We would like to provide up-to-date information regarding the interesting functions of sulfurtransferases to researchers investigating not only sulfurtransferases but also other enzymes. In addition to researchers studying enzymes from prokaryotic and eukaryotic cells, this book's target audience includes clinicians.

For over 50 years, studies have continued to elucidate the important physiological roles of sulfurtransferases in prokaryotes and eukaryotes. The sulfurtransferases include thiosulfate sulfurtransferase (rhodanese, EC 2.8.1.1), mercaptopyruvate sulfurtransferase (MST, EC 2.8.1.2), thiosulfate-thiol sulfurtransferase (EC 2.8.1.3), tRNA uracil 4-sulfurtransferase (EC 2.8.1.4), thiosulfate-dithiol sulfurtransferase (EC 2.8.1.5), biotin synthase (EC 2.8.1.6), cysteine desulfurase (EC 2.8.1.7), lipoyl synthase (EC 2.8.1.8), molybdenum cofactor sulfurtransferase (EC 2.8.1.9), thiazole synthase (EC 2.8.1.10), molybdopterin synthase sulfurtransferase (EC 2.8.1.11), molybdopterin synthase (EC 2.8.1.12), tRNA-uridine 2-sulfurtransferase (EC 2.8.1.13), tRNA-5-taurinomethyluridine 2-sulfurtransferase (EC 2.8.1.14), tRNA-5-methyluridine (54) 2-sulfurtransferase (EC 2.8.1.15), and L-aspartate semialdehyde sulfurtransferase (EC 2.8.1.16). Among these enzymes, rhodanese and MST have recently attracted increasing amounts of attention due to their reported ability to produce polysulfide and hydrogen sulfide. In this project, many researchers who had previously researched many sulfurtransferases could not be enrolled for specific reasons; as this field of research is still in its nascency, there are difficulties associated with securing funding and research positions. Additionally, many sulfurtransferases have not yet been studied. Therefore, it was impossible to completely cover the topic of sulfurtransferases in this book.

In my youth, one of my mentors taught me that scientists should aim for the following three things: (i) discover new things, (ii) deny falsely believed ideas, and (iii) establish new concepts. I have tried my best to achieve these aims; however, I have realized that these contributed researchers are far ahead of me when I contacted with these contributions.

I would like to thank all the researchers who have contributed to this book despite various unforeseen circumstances during the coronavirus pandemic and considering the current global status. I am also grateful for their deep understanding, given that this publication was delayed for a year. Lastly, I appreciate Prof. Gupta (general editor of this series) for giving me such a wonderful opportunity for editing this book.

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New insight into the role of TST-derived hydrogen sulfide, a key regulator of mesenteric homeostasis in health and during chronic fructose intake

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Introduction

In recent decades, the role of hydrogen sulfide (H_2S), a gas mediator and signaling agent, has been studied in the regulation of intercellular signaling and intracellular signal transduction pathways with various physiological and pathophysiological effects in cells and tissues (Kimura, 2021). These cellular pathways are responsible for changes in metabolism, epigenetic, and cellular behavior. There are enzymatic and non-enzymatic pathways of endogenous hydrogen sulfide biosynthesis (Kaczor-Kamińska et al., 2021; Nagahara & Wróbel, 2020). Numerous studies have shown the diverse effects of H_2S on the physiological processes of neurotransmission in the brain, vascular smooth muscle relaxation in synergy with nitric oxide (NO), apoptosis, autophagy, angiogenesis, aging, inflammation, redox system, manifestations of oxidative stress, protein (Bronowicka-Adamska et al., 2019; Hazari et al., 2018; Kashfi, 2014; Lebeaupin et al., 2020; Szlęzak et al., 2021; Xia et al., 2020; Zhang et al., 2021b), as well as bioenergetic effects and systemic bioregulatory effects (Nagahara, 2020), including ANS (Kovalchuk et al., 2018).

Recently, it was shown that H_2S signaling is often dysregulated in different dysfunctions. The effect of H_2S on insulin secretion and protection of the heart, kidneys, and brain from ischemic damage, and hypoxia is known (Dilek et al., 2020; Gröger et al., 2019; Lignelli et al., 2021; Peleli et al., 2020; Powell et al., 2018; Zhang et al., 2021a). The

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