

Preface

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The present “Guanylate Cyclase, Volume 2” follows the earlier “Guanylate Cyclase” volume published in January 2002 (Molecular Cellular Biochemistry 230, Nos. 1&2 January (II) 2002. In the 7 years span, the field of cyclic GMP signal transduction has made rapid and important advances. It is now established that cyclic GMP is omnipresent intracellular second messenger of prokaryotes and eukaryotes. Catalyzed by membrane-bound and soluble forms of guanylate cyclase, it plays a critical role in the control of physiological processes of cardiovascular, smooth muscle relaxation, blood pressure, blood volume, cellular growth, sensory transduction, neural plasticity, learning, and memory. Depending upon its cell source, it is produced and functions through multiple pathways. Eighteen chapters, written by the leaders in the field, comprehensively narrate its existing facets. The first chapter is an “overview” of the entire mammalian membrane guanylate cyclase field. It begins with the historical chronological development of the field, recognizes major contributions of the original investigators, corrects misplaced facts, projects on its present and future trend, and presents a universal concept where Ca^{2+} and membrane guanylate cyclase are locked in the de- and hyper-polarization processes of the neurons. It is followed by four chapters, which cover the peptide hormone receptor membrane guanylate cyclase research. Chapter seven deals with the cross-talk between cyclic AMP and cyclic GMP signaling pathways; Chapter eight through twelve with the Ca^{2+} -modulated vision linked ROS-GC subfamily of membrane guanylate cyclases. This subfamily may also play a role in reproductive

physiology; it has been discussed in Chapter 13. In a new trend in the field, Chapters 14 and 15 demonstrate that a member of the Ca^{2+} -modulated ROS-GC subfamily, ONE-GC, is linked with the odorant transduction. Chapter 16 deals with the presence of the yet physiologically uncharacterized ROS-GC subfamily in the taste buds, pineal gland, and hippocampal neurons. Chapter 17 discusses diversity of the sensory guanylate cyclases in teleost fishes. Chapter 18 shows presence of the cyclic GMP transduction system in the unicellular organisms, bacteria. And chapter 19 presents new physiological and pharmacological insights on the nitric oxide-dependent receptive guanylate cyclase.

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Title	Contributors
1. Preface	Rameshwar K. Sharma, Guest Editor, Elkins Park, USA; Teresa Duda, Guest Co-Editor, Elkins Park, USA
2. Membrane guanylate cyclase is a beautiful signal transduction machine (Overview)	Rameshwar K. Sharma
3. Atrial natriuretic factor receptor guanylate cyclase, ANF-RGC, signal transduction mechanism	Teresa Duda
4. Central role of guanylyl cyclase in natriuretic peptide signaling in hypertension and metabolic syndrome	Guy Martel, Pavel Hamet and Johanne Tremblay
5. Receptor guanylyl cyclase C (GC-C): regulation and signal transduction	Nirmalya Basu, Najla Arshad and Sandhya S. Visweswariah
6. Ligand-mediated endocytosis and intracellular sequestration of guanylyl cyclase/natriuretic peptide receptors: role of GDAY motif	Kailash N. Pandey

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Title	Contributors
7. A new Rac/PAK/GC/cGMP signaling pathway	Dagang Guo, J. Jillian Zhang and Xin-Yun Huang
8. Ca ²⁺ -modulated vision-linked ROS-GC guanylate cyclase transduction machinery	Karl W. Koch, Teresa Duda and Rameshwar K. Sharma
9. Mg ²⁺ /Ca ²⁺ cation binding cycle of guanylyl cyclase activating proteins (GCAPs): role in regulation of photoreceptor guanylyl cyclase	Alexander M. Dizhoor, Elena V. Olshevskaya, and Igor V. Peshenko
10. Involvement of rhodopsin and ATP in the activation of membranous guanylate cyclase in retinal photoreceptor outer segments (ROS-GC) by GC-activating proteins (GCAPs): A new model for ROS-GC activation and its link to retinal diseases.	Vladimir A Bondarenko, Fumio Hayashi, Jiro Usukura and Akio Yamazaki
11. Novel functions of photoreceptor guanylate cyclases revealed by targeted deletion	Sukanya Karan, Jeanne M. Frederick and Wolfgang Baehr
12. Guanylate cyclases and associated activator proteins in retinal disease	David M Hunt, Prateek Buch and Michel Michaelides

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Title	Contributors
13. Ca ²⁺ -modulated membrane guanylate cyclase in the testes	Anna Jankowska and Jerzy B. Warchol
14. Odorant-linked ROS-GC subfamily membrane guanylate cyclase transduction system	Rameshwar K. Sharma and Teresa Duda
15. Receptor guanylyl cyclases in mammalian olfactory function	Frank Zufall and Steven D. Munger
16. ROS-GC subfamily membrane guanylate cyclase linked transduction systems: Taste, Pineal Gland and Hippocampus	Rameshwar K. Sharma and Teresa Duda
17. Diversity of sensory guanylate cyclases in teleost fishes	Nina Rättscho, Alexander Scholten and Karl W. Koch
18. cGMP production in bacteria	Jürgen U. Linder
19. New insight into the functioning of nitric oxide-receptive guanylyl cyclase: physiological and pharmacological implications	John Garthwaite