

Preface

Heart disease is the most lethal human condition in the Western world. The cardiovascular system is one of the most complex biological systems in mammals and is under constant and tight regulation by various endogenous hormones and neurotransmitters. The adrenergic system is, arguably, among those entities that regulate the heart and vessels, the most studied to date. Although not theoretically essential for life, like its cholinergic (or parasympathetic) counterpart is, the adrenergic (or sympathetic) branch of the autonomic nervous system is still essential for the communication of each mammalian organism with its environment and for the response and survival to stress. The cardiovascular system is probably the most important organ system that needs to be regulated and mobilized by the adrenergic hormones (epinephrine and norepinephrine) in order to orchestrate the individual's systemic response to environmental stimuli or insults. Thus, it comes as no surprise that the cardiovascular system is tightly regulated by the adrenergic nervous system and that, in situations where this cardiovascular adrenergic system goes awry, some cardiovascular morbidity or disease almost always ensues. Another testament for the biological and physiological importance of the cardiovascular adrenergic system in medicine and physiology is the fact that a recent Nobel Prize (the 2012 Nobel Prize in Chemistry) was awarded to the identification and crystallization of some of the receptors the cardiovascular adrenergic system depends on to exert its effects (and which are extensively discussed throughout this book), i.e. the G protein-coupled beta-adrenergic receptors.

The present book is an attempt to provide a state-of-the-art, up-to-date overview of the cardiovascular adrenergic system and its roles in heart and vessels' physiology, disease and therapy. It is accordingly structured into two major sections focusing on the interplay between the cardiovascular and adrenergic systems, immediately following an introductory chapter on general biological considerations of the adrenergic nervous system in mammals. The first of these sections comprises chapters describing the adrenergic receptors and their effects in each cardiovascular cell type separately, one by one (cardiac myocytes, cardiac fibroblasts, vascular endothelial cells, vascular smooth muscle cells). The second section consists of chapters that describe and discuss the roles of the cardiovascular adrenergic system in certain diseases/conditions, such as cardiovascular metabolism, aging, the interface between

the central/autonomic nervous systems and the cardiovascular system, as well as in certain cardiovascular therapeutic modalities, such as physical exercise and cellular (cardiac stem cell) therapies. Throughout these chapters, the authors spotlight future avenues for research in basic pathophysiology and in cardiovascular therapy/prevention, in addition to thorough overviews of the current literature pertaining to the adrenergic system and its biological effects.

The comprehensive overview of the effects of the adrenergic hormones and their receptors across the cardiovascular system provided within this book is expected to assist the reader in comprehending the importance of taking into account the role of the adrenergic system in cardiovascular pathologies and also to address questions and unresolved issues regarding the treatment of those cardiovascular pathologies.

Finally, the editor would like to express his sincere appreciation to all the contributors for their dedicated collaboration in this project. I also wish to thank Ms. Susan Westendorf for her competent and patient support, which was instrumental in editing this book.

I sincerely hope this book will enable readers to connect biomedical and clinical knowledge from the field of cardiology with the basic biological principles and concepts of the molecular physiology and pharmacology of the adrenergic nervous system, thereby encouraging future discoveries and developments of new strategies and agents for combating cardiovascular disease and for promoting heart health.

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