Endothelium, Nitric Oxide, and Atherosclerosis: From Basic Mechanisms to Clinical Implications

The discovery of nitric oxide as an essential effector of many biological phenomena surely stands out as one of the most important achievements of 20th century biomedical investigation. As a cardiovascular clinician and investigator, the earliest studies of endothelium-derived relaxing factor and nitric oxide in vascular biology are especially gratifying in that they established the scientific infrastructure on which the much broader scope of nitric oxide biology was ultimately based. Understanding the many roles of nitric oxide in cardiovascular biology and pathobiology, in particular, has shed light on basic mechanisms of cardiovascular function, on fundamental mechanisms of cardiovascular disease, and on conventional and novel approaches to cardiovascular therapeutics.

With this background, I was not surprised to learn that 53 books have been published on nitric oxide biology and chemistry in the last 10 years, and 10 of these have focused on the cardiovascular system. Therefore, when asked to review this volume, I was impelled to ask the question, “Do we need yet another text on nitric oxide?”

The answer to the question is no and yes. No, I do not think we need yet another text purporting to review the importance of nitric oxide in the vasculature because the topic has been more than adequately covered in many other texts and reviews. However, because of the rapidity with which the field of nitric oxide biology is changing, especially as it relates to cardiovascular biomedicine, it is clear even to one well versed in the topic that it is not easy to keep current. Thus, I also have to answer that, yes, we can benefit from another text on the role of nitric oxide in the vasculature, especially as it relates to atherosclerosis and endothelial dysfunction, provided that it is comprehensive and timely.

The editors of Endothelium, Nitric Oxide, and Atherosclerosis have done a fine job of providing a superb overview of the field of nitric oxide in cardiovascular biology and medicine that is both current and insightful. Assembling a highly regarded group of chapter authors, each of whom has made seminal contributions to the field, the editors have put together a thorough review of the particular role played by nitric oxide in endothelial biology and pathobiology. The text is divided into 4 parts: endothelium and biology of nitric oxide, basic mechanisms of endothelial dysfunction, clinical studies of endothelial function and dysfunction, and therapeutic strategies to improve endothelial dysfunction. The specific chapter topics covered range widely and include a historical overview of the field by Robert Furchgott, intracellular signaling mechanisms by Richard Cohen, insights gained from studies of endothelial nitric oxide synthase knockout mice by Paul Huang and colleagues, endothelial dysfunction and vascular disease by Paul Vanhoutte, and oxidant stress and endothelial function in patients with risk factors for atherosclerosis by Mark Creager, to name but a few. Despite the well-recognized criticism that the routine delays in textbook publishing render timely topics outdated by the time they come to press, this book is remarkably free of major scientific anachronisms in this rapidly evolving field.

A weakness of the book is that the editors have sacrificed thoroughness for novelty. Presumably in an effort to highlight cutting-edge information, they failed to include chapters on established topics clearly relevant to the central theme of the book. For example, they excluded a detailed discussion of the role of endothelial nitric oxide in the regulation of endothelial-leukocyte interactions and thrombotic responses, yet included a chapter on the evolving yet underdeveloped (and somewhat controversial) area of the participation of hemoglobin-bound nitric oxide in the mammalian respiratory cycle. In addition, I would have preferred that they include an overview of the chemistry of nitric oxide, a particularly important and confusing subject that could have set the stage for many of the topics covered in later chapters, especially those that focus on oxidant stress.

Notwithstanding these shortcomings, Endothelium, Nitric Oxide, and Atherosclerosis is a fine text that can serve as a timely reference for anyone interested in the role of nitric oxide in cardiovascular biology and medicine. I recommend it to basic and clinical investigators alike, and I think that it adds an important facet to the growing reference literature in this rapidly expanding field.

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