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Heart Physiology: From Cell to Circulation

By Lionel H. Opie



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Thoroughly revised and updated, this Fourth Edition is the only current book that integrates cellular and subcellular elements of cardiovascular physiology in the analysis of physiologic and pathophysiologic responses. In straightforward terms, with more than 600 diagrams and illustrations, the book explains the key principles crucial to understanding how the cardiovascular system and its components function and malfunction.

For this edition, Dr. Opie has enlisted eight internationally eminent co-authors and added a new chapter on cell signaling. The chapters on physiology of the ECG and arrhythmias contain many more ECGs. More than half of the illustrations—including 12 color plates—are new.



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Editorial Review

From The New England Journal of Medicine

Cardiovascular disease is still the chief cause of death in our society. It is therefore not surprising that the field of cardiovascular science continues to expand rapidly, particularly at the cellular and subcellular levels. This expansion can cause difficulties for clinicians and medical students. Yet an understanding of the "new" physiology is essential for the proper use of new forms of medical technology and pharmacologic agents. It is in this context that Lionel Opie's opus expertly integrates cellular and subcellular elements of cardiovascular physiology in an analysis of physiologic responses.

The book starts with an overview of the cardiovascular system, including descriptions of electrophysiologic principles, excitation-contraction coupling, and mechanisms of receptor and signal transduction. The discussion of these mechanisms then leads to a review of cardiac function and finally, to an integrative analysis of the circulation and pathologic conditions that affect it. A particularly strong feature of this book is that the discussion always goes back to cellular and subcellular mechanisms, maintaining the connection between cellular physiology and overall integrative physiology.

An omission from this otherwise comprehensive book is a discussion of molecular mechanisms. There is nothing on transcriptional and translational regulation of enzyme systems and receptors, nor is there much information about new experimental models, including transgenic animals. Perhaps the next edition will rectify this oversight.

This book is well written. Each chapter has numerous figures, a large proportion of which were prepared especially for this new edition. There are also many summary tables. A minor criticism is that the abundant figures, some of which are redundant, can cause confusion by illustrating the same point in different ways.

Dr. Opie has given this book a very nice scholarly touch by placing a quote at the beginning of some chapters and by including historical notes throughout the text. Each extensively referenced chapter allows the reader to look up the primary sources and learn about any of the subjects in more detail.

The book has been designed to work as a textbook. Each chapter ends with a summary of the major points and sets of questions for students and cardiologists in training. This makes the book ideal not only for students and trainees but also for cardiologists who want to review cardiovascular physiology and the principles underlying new therapeutic agents.

How does this book relate to the book by Arnold Katz with a similar name, *Physiology of the Heart* (Second edition. New York: Raven Press, 1992)? Opie deals with this in his preface. He says that his book should be viewed as a companion to and not a competitor of Katz's book and other cardiology textbooks. I completely agree. Opie's book provides information on pharmacology and integrative physiology that complements information on mechanisms related to contraction and energetics discussed in Katz's book. But other cardiovascular textbooks contain more clinical and therapeutic information.

The one fault I find with this book is the lack of appreciation of the integration of the heart with the venous circuit and of the effect of this integration on cardiac function. For example, in the section on cardiac output and exercise, the author states, "During dynamic exercise, it is the increased heart rate that provides most of the adaptation. In addition, there is an increased venous return, which acts by the Frank-Starling mechanism." Since cardiac output must equal venous return in the steady state, any increase in cardiac output must equal the increase in venous return. There is no additional increase in venous return. The failure to

recognize this point leads to a number of weaknesses in the integrative sections and sometimes to a failure to appreciate which cardiac variables are independent and which are dependent. However, this point does not detract from the overall usefulness of this very fine book.

Reviewed by Sheldon Magder, M.D.

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Review

Circulation, 21-SEP-04, Volume 110, Issue 12, William H. Barry, MD, University of Utah Health Sciences Center, Salt Lake City, UT -- "Many excellent basic cardiovascular science and clinical cardiology texts are available to help the academic or practicing cardiologist keep abreast of the rapid developments in these areas. Few, however, combine a lucid and up-to-date description of new and established findings in laboratory research with an informed discussion of their clinical relevance to the pathophysiology and treatment of cardiac disease. This new edition of Dr. Opie's highly regarded book does this extremely well..." "I believe this book should be required reading for 1st-year cardiology fellows and will be very useful as well to the established cardiologist wishing to maintain a current knowledge base in cardiovascular science that is relevant to their practice."-Circulation

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