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Book review
Excitation-Contraction Coupling and Cardiac Contractile Force.

Second Edition. By Donald M. Bers, Ph.D. Kluwer Academic Publishers

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The past few decades have witnessed extraordinary scientific and medical discoveries in cardiovascular research. These discoveries improved our understanding to the key questions that have aroused uncertainty, disagreement, or controversy in cardiology. How is the heartbeat generated? What controls the cardiac contraction? What links the cardiac structure with its function? How does our understanding of movement in skeletal muscle, smooth muscle and non-muscle cells influence our thinking about the development of force in cardiac muscle? Are there important interspecies specific differences in how contraction is regulated in the heart? Dr. Bers engaged himself in a very challenging task with the writing of a book on calcium regulation in cardiac muscle cells and has integrated an incredible amount of information to answer these important questions. This comprehensive and multidisciplinary book covers electrophysiology, cellular physiology, molecular biology, pharmacology and clinical cardiology.

The book contains 10 chapters, each of which deals with a specific aspect of the processes and molecular mechanisms of excitation-contraction coupling (E-C coupling) in the heart. The book begins with the introduction of major cellular structures involved in E-C coupling and then describes the characteristics of myofilaments as the end effector of E-C coupling and Ca sensitivity of the myofilaments. A general framework of Ca sources and Ca sinks with quantitative values for the processes involved in Ca regulation in cardiac myocytes are provided in Chapter 3. Chapter 4 reviews cardiac action potential and basic understanding of the cardiac ion channels, which contribute to shape and modulation of action potential. Subsequent chapters discuss in detail about sarcolemmal Ca channels, Na/Ca exchange and sarcolemmal Ca-pump. This is followed by a detailed description of sarcoplasmic reticulum Ca uptake, content and release. Chapter 8 is focused on E-C coupling mechanisms in skeletal, cardiac and smooth muscle. Dr. Bers discusses voltage-dependent Ca release, Ca-induced Ca release and IP_3-induced Ca release. In addition, chapter 9 clarifies the dynamic interplay of transsarcolemmal and trans-SR Ca fluxes in different cardiac muscle preparations and under different experimental situations. Finally, the last chapter discusses the general mechanisms involved in cardiac inotropy and their relationship to cellular Ca overload and mismanagement.

The book is well written and edited by a distinguished professor who has first-hand experience in this field for decades. It is easy and delightful to read, and many of the chapters provide a summary and notes that are practical and easy to follow and remember. The book is attractively set out. Nearly all of the chapters include figures and tables that summarize pertinent studies and findings. The illustrations are clear and the bibliography is extensive. There are 178 figures, 27 tables and 2509 references in the book. Most importantly, the book is provocative, intellectually challenging, and sure to stimulate new ideas in the rapidly growing field of cardiovascular research.

In general, this book is a unique, evidence-based, timely, and well-organized resource that will be of great value to medical and graduate students, cardiology fellows, cardiologists as well as senior scientists in the field of cardiovascular system.