THE VENTRICLE

THE VENTRICLE

Basic and Clinical Aspects

Edited by

Herbert J. Levine

William H. Gaasch

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PREFACE

Cardiac anatomy had already been a subject of great interest for centuries when Harvey described the dynamic nature of blood flow, but the concept of defining ventricular function was first introduced with the measurement of a mare's blood pressure by Steven Hales in 1733. Amidst the important contributions of a number of European physiologists, the primal relationship between the mechanical energy of the heart and the length of a myocardial fiber was enunciated by E.H. Starling in 1912; this became known as the "law of the heart." Perhaps the first major refinement of this law was suggested by Sarnoff and co-workers, who introduced the concept of homeometric autoregulation to explain the intrinsic adaptations to myocardial contraction that were not related to fiber length. While measures of cardiac pump function were being refined and extended to the diseased heart, the principles of basic muscle mechanics developed by A.V. Hill were applied to cardiac muscle by Abbott and Mommaerts and by Sonnenblick in the 1950s and 1960s. This work provided a framework for interrelating the mechanics, ultrastructure, and biochemistry of heart muscle. Among the challenges encountered in applying these principles to hypertrophied and diseased hearts was the realization that methods were needed to characterize accurately the diastolic properties of the ventricle. As a result, the decade of the 1970s witnessed a renaissance of diastole, and with it emerged a clarification of the distinction between congestive failure—a disease of cardiac diastole—and myocardial failure—a defect in systolic performance.

During the past two decades a prodigious volume of information on left ventricular function

and its control in health and disease has been published. Studies of hypertrophy, heart failure, ischemia, and infarction have been vigorously pursued in experimental animals and in human subjects, and as a result new areas for study have emerged. These include the process of hypertrophy as an adaptive mechanism, the coronary vascular reserve in hypertrophy, the role of the microvasculature in myocardial failure, active relaxation and other diastolic mechanisms that contribute to the syndrome of congestive heart failure, ventricular interaction and the role of the normal pericardium, ischemic-stunned-reperfused myocardium, and vasoactive drugs in the treatment of heart failure. *The Ventricle* seeks to take inventory of our current knowledge of these areas. A special effort was made to present information that overlapped studies of the experimental animal, the normal and diseased human heart, and when appropriate, the isolated muscle or its constituents. The text will likely be of greatest value to the physician-investigator who labors at the interface of clinical heart disease and its managements and the mechanisms underlying cardiac disorders.

The editors are grateful to Sandra Nauseda for her expert secretarial skills and to Jeffrey Smith of Martinus Nijhoff Publishing for his role in initiating and sustaining the necessary momentum to bring *The Ventricle* to press. The editors particularly wish to thank the contributors to this volume for the tremendous effort and meager rewards they have accepted. It is our hope that the ideas and information presented in this text will stimulate others to consider the current issues and ask new questions to advance our understanding of ventricular function.