HEART DISEASE

A Textbook of Cardiovascular Medicine

Edited by
EUGENE BRAUNWALD, M.D.

HEART DISEASE

A Textbook of Cardiovascular Medicine

Edited by

EUGENE BRAUNWALD, M.D.

Hersey Professor of the Theory and Practice
of Physic (Medicine) and Head, Department
of Medicine at the Peter Bent Brigham Hospital,
Harvard Medical School; Physician-in-Chief,
Affiliated Hospitals Center, Boston

W. B. SAUNDERS COMPANY
Philadelphia · London · Toronto

CONTRIBUTORS

JOSEPH S. ALPERT, M.D.

Professor of Medicine, University of Massachusetts; Director, Division of Cardiovascular Medicine, University of Massachusetts Medical Center, Worcester, Massachusetts

MURRAY G. BARON, M.D.

Chairman, Department of Radiology, Long Island Jewish Hillside Medical Center, New Hyde Park, New York; Professor of Radiology, State University of New York at Stony Brook, New York

WILLIAM HARVEY BARRY, M.D.

Assistant Professor of Medicine, Harvard Medical School; Associate in Medicine, Peter Bent Brigham Hospital, Boston, Massachusetts

J. THOMAS BIGGER, JR., M.D.

Professor of Medicine and of Pharmacology, College of Physicians and Surgeons, Columbia University; Attending Physician, The Presbyterian Hospital in the City of New York, New York, New York

EUGENE BRAUNWALD, M.D., M.A. (HON.)

Hersey Professor of the Theory and Practice of Medicine, Harvard Medical School; Physician-in-Chief, Peter Bent Brigham Hospital, Boston, Massachusetts

MICHAEL S. BROWN, M.D.

Paul J. Thomas Professor of Medicine and Genetics and Director, Center for Genetic Disease, University of Texas Health Science Center; Senior Attending Physician, Parkland Memorial Hospital, Dallas, Texas

PETER F. COHN, M.D.

Associate Professor of Medicine, Harvard Medical School; Senior Associate in Medicine and Director, Clinical Cardiology Service, Peter Bent Brigham Hospital, Boston, Massachusetts

WILSON S. COLUCCI, M.D.

Instructor, Department of Medicine, Harvard Medical School and Peter Bent Brigham Hospital, Boston, Massachusetts

ERNEST CRAIGE, M.D.

Henry A. Foscue Distinguished Professor of Cardiology, University of North Carolina School of Medicine, Chapel Hill, North Carolina

JOHN R. DARSEE, M.D.

Research Fellow in Cardiology, Harvard Medical School and Peter Bent Brigham Hospital, Boston, Massachusetts

ROMAN W. DESANCTIS, M.D.

Professor of Medicine, Harvard Medical School; Physician and Director, Coronary Care Unit, Massachusetts General Hospital, Boston, Massachusetts

DORIS J. W. ESCHER, M.D.

Professor of Medicine, Albert Einstein College of Medicine of Yeshiva University; Attending Physician, Department of Medicine, and Head, Cardiac Catheterization Laboratory, Montefiore Hospital and Medical Center, Bronx, New York

HARVEY FEIGENBAUM, M.D.

Professor of Internal Medicine and Senior Research Associate, Krannert Institute of Cardiology, Indiana University School of Medicine, Indianapolis, Indiana

MANNING FEINLEIB, M.D., DR. P.H.

Associate Director for Epidemiology and Biometry, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland; Clinical Professor, Georgetown University School of Medicine, Washington, D.C.; Visiting Lecturer on Epidemiology, Harvard School of Public Health, Boston, Massachusetts

NANCY C. FLOWERS, M.D.

Professor and Chief, Division of Cardiology, Department of Medicine, University of Louisville School of Medicine; Chief of Cardiology, Louisville General Hospital, Louisville, Kentucky

WILLIAM F. FRIEDMAN, M.D.

J. H. Nicholson Professor of Pediatric Cardiology, University of California, Los Angeles School of Medicine; Professor and Chairman, Department of Pediatrics, U.C.L.A. Hospital and Clinics, Los Angeles, California

GOFFREDO G. GENSINI, M.D.

Clinical Professor of Medicine, SUNY, Upstate Medical Center; Director, Monsignor Toomey Cardiovascular Laboratory and Research Department, St. Joseph's Hospital Health Center, Syracuse, New York

JOSEPH L. GOLDSTEIN, M.D.

Paul J. Thomas Professor of Medicine and Genetics and Chairman, Department of Molecular Genetics, University of Texas Health Science Center; Senior Attending Physician, Parkland Memorial Hospital, Dallas, Texas

MICHAEL N. GOTTLIEB, M.D.

Assistant Clinical Professor of Medicine, Harvard Medical School; Junior Associate in Medicine, Peter Bent Brigham Hospital, Boston, Massachusetts

WILLIAM GROSSMAN, M.D.

Associate Professor of Medicine, Harvard Medical School; Director, Cardiac Catheterization Laboratory, Peter Bent Brigham Hospital, Boston, Massachusetts

THOMAS P. HACKETT, M.D.

Eben S. Draper Professor of Psychiatry, Harvard Medical School; Chief, Psychiatry Service, Massachusetts General Hospital, Boston, Massachusetts

B. LEONARD HOLMAN, M.D.

Associate Professor of Radiology (Nuclear Medicine), Harvard Medical School; Chief of Clinical Nuclear Medicine, Peter Bent Brigham Hospital, Boston, Massachusetts

LEO G. HORAN, M.D.

Professor and Chairman, Department of Medicine, University of Louisville School of Medicine; Chief of Medical Service, Louisville General Hospital, Louisville, Kentucky

ROLAND H. INGRAM, JR., M.D.

Parker B. Francis Professor of Medicine, Harvard Medical School; Director, Pulmonary Division, and Physician, Peter Bent Brigham Hospital, Boston, Massachusetts

NORMAN M. KAPLAN, M.D.

Professor of Internal Medicine, University of Texas Southwestern Medical School; Chief, Hypertension Service, Parkland Memorial Hospital, Dallas, Texas

ROBERT I. LEVY, M.D.

Director, National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland

BERNARD LOWN, M.D.

Professor of Cardiology, Harvard School of Public Health; Physician, Peter Bent Brigham Hospital, Boston, Massachusetts

E. REGIS MCFADDEN, JR., M.D.

Associate Professor of Medicine, Harvard Medical School; Senior Associate Physician, Peter Bent Brigham Hospital, Boston, Massachusetts

JOSEPH K. PERLOFF, M.D.

Professor of Medicine and Pediatrics, University of California at Los Angeles; Division of Cardiology, Center for the Health Sciences, U.C.L.A., Los Angeles, California

ROBERT ROBERTS, M.D.

Associate Professor of Medicine, Washington University School of Medicine; Director, Cardiac Care Unit, Barnes Hospital, St. Louis, Missouri

JERROLD F. ROSENBAUM, M.D.

Instructor in Psychiatry, Harvard Medical School and Massachusetts General Hospital; Director, Psychopharmacology Clinics, Department of Psychiatry, Massachusetts General Hospital, Boston, Massachusetts

DAVID S. ROSENTHAL, M.D.

Associate Professor of Medicine, Harvard Medical School and Peter Bent Brigham Hospital; Senior Associate in Medicine and Clinical Director, Hematology Division, Peter Bent Brigham Hospital, Boston, Massachusetts

JOHN ROSS, JR., M.D.

Professor of Medicine and Chief, Cardiovascular Division, Department of Medicine, University of California at San Diego School of Medicine, San Diego, California

L. THOMAS SHEFFIELD, M.D.

Professor of Medicine, University of Alabama School of Medicine; Director, ECG Laboratory and Allison Laboratory of Exercise Electrophysiology, University Hospital; Consultant Physician, Veterans Administration Hospital, Birmingham, Alabama

EVE E. SLATER, M.D.

Assistant Professor of Medicine, Harvard Medical School; Chief, Hypertension Unit, Massachusetts General Hospital, Boston, Massachusetts

THOMAS W. SMITH, M.D.

Professor of Medicine, Harvard Medical School; Physician and Chief of Cardiovascular Division, Peter Bent Brigham Hospital, Boston, Massachusetts

BURTON E. SOBEL, M.D.

Professor of Medicine, Washington University School of Medicine; Cardiologist-in-Chief, Barnes Hospital, St. Louis, Missouri

EDMUND H. SONNENBLICK, M.D.

Professor of Medicine and Chief, Division of Cardiology, Department of Medicine, Albert Einstein College of Medicine of Yeshiva University, Bronx, New York

GENE H. STOLLERMAN, M.D.

Professor and Chairman, Department of Medi-

cine, University of Tennessee College of Medicine; Physician-in-Chief,.City of Memphis Hospital, Memphis, Tennessee

LOUIS WEINSTEIN, M.D., PH.D.

Visiting Professor of Medicine, Harvard Medical School; Director of the Clinical Services, Division of Infectious Diseases, Department of Medicine, Peter Bent Brigham Hospital, Boston, Massachusetts

GORDON H. WILLIAMS, M.D.

Associate Professor of Medicine, Harvard Medical School; Physician and Director, Endocrinology-Hypertension Unit, Peter Bent Brigham Hospital, Boston, Massachusetts

ROBERT W. WISSLER, M.D.

Donald N. Pritzker Distinguished Service Professor of Pathology, Pritzker School of Medicine, University of Chicago, Chicago, Illinois

MARSHALL A. WOLF, M.D.

Assistant Professor of Medicine, Harvard Medical School; Associate Physician-in-Chief, Peter Bent Brigham Hospital, Boston, Massachusetts

JOSHUA WYNNE, M.D.

Assistant Professor of Medicine, Harvard Medical School; Director, Noninvasive Cardiac Laboratory, Peter Bent Brigham Hospital, Boston, Massachusetts

PREFACE

Today cardiovascular disease is the greatest scourge afflicting the population of the industrialized nations. As with previous scourges—bubonic plague, yellow fever, and smallpox—cardiovascular disease not only strikes down a significant fraction of the population without warning but causes prolonged suffering and disability in an even larger number. In the United States alone, cardiovascular disease was responsible for almost one million fatalities in 1979—*well over one-half of all reported deaths.* Almost 5 million persons afflicted with cardiovascular disease are hospitalized annually. The cost of this disease in terms of human suffering is almost incalculable: direct annual costs approximate $16 billion, and indirect annual costs due to morbidity amount to over $8 billion.

Fortunately, research focusing on the causes, diagnosis, treatment, and prevention of heart disease is moving ahead rapidly. In the last 25 years, in particular, we have witnessed an explosive expansion of our understanding of the structure and function of the cardiovascular system—both normal and abnormal—and of our ability to evaluate these parameters in the living patient, sometimes by means of techniques that require penetration of the skin but also, with increasing accuracy, by noninvasive methods. Simultaneously, remarkable progress has been made in preventing and treating cardiovascular disease by medical and surgical means. Indeed, in the United States, a steady reduction in mortality from cardiovascular disease during the past decade suggests that the effective application of this increased knowledge is beginning to prolong man's life span, the most valued resource on earth.

An attempt to summarize our present understanding of heart disease in a comprehensive textbook for the serious student of this subject is a formidable undertaking. Following the untimely death of Dr. Charles K. Friedberg, whose masterful text served as a bible to me and to a whole generation of cardiologists during the 1950's and 1960's, the W. B. Saunders Company invited me to accept this responsibility. Younger colleagues, particularly cardiology fellows and medical residents at the Brigham, convinced me of the need for such a book, and the Dean of the Harvard Medical School and the Trustees of the Peter Bent Brigham Hospital graciously allowed me to devote a sabbatical year toward completion of this project.

A single text—even a long one—cannot adequately cover every aspect of a subject as extensive as heart disease. Thus, my first task was to define those areas of the field that should be included. Since the early part of this century, clinical cardiology has had a particularly strong foundation in the basic sciences of physiology and pharmacology. More recently, the disciplines of molecular biology, genetics, developmental biology, biophysics, biochemistry, experimental pathology, and bioengineering have also begun to provide critically important information about cardiac function and malfunction. Although it was decided that *Heart Disease* was to be primarily a clinical treatise and not a textbook of fundamental cardiovascular science, an effort has been made to explain, in some detail, the scientific basis of cardiovascular diseases. To achieve this objective, the sciences fundamental to heart disease are in most cases presented in the chapters describing the various disease states and their treatment rather than in separate chapters. While it is recognized that cardiovascular surgery has had an enormous impact on the management of patients with heart disease, the major emphasis in this book is on the rationale and indications for cardiac operations rather than on operative techniques per se.

Heart Disease is divided into four parts: Part I deals with the examination of the patient in the broadest sense, including clinical findings and the theory and application of modern invasive and noninvasive techniques used to elicit information about the heart and the circulation. Part II is concerned with the pathophysiology, diagnosis, and treatment of the princi-

pal abnormalities of circulatory function, including heart failure, shock, arrhythmias, and abnormalities of arterial pressure. Part III consists of descriptions of the principal congenital and acquired diseases affecting the heart, pericardium, aorta, and pulmonary vascular bed in adults and children. Primary disease of other organ systems, such as the nervous, hematopoietic, endocrine, renal, and pulmonary systems, is frequently accompanied by important cardiac complications. Conversely, the presence of heart disease may significantly affect other organs and may alter the patient's response to the stresses of general anesthesia, pregnancy and delivery, and surgical procedures. Cardiovascular disorders are often expressions of systemic diseases that involve other organ systems as well. Both the internist and the cardiologist must frequently deal with these disorders that lie at the interface between cardiology and other areas of medicine such as neurology, rheumatology, psychiatry, and obstetrics. It is my impression that patients with these conditions present particularly challenging problems to both cardiac and noncardiac specialists. Accordingly, Part IV discusses the manner in which diseases of other organ systems affect the circulation and vice versa.

In order to provide a comprehensive, authoritative text in a field that has become as broad and deep as cardiovascular medicine, I chose to enlist contributions from a number of able colleagues. However, my personal involvement in the writing of about half the book has made possible a deliberate effort to eliminate the fragmentation, gaps, inconsistencies, organizational difficulties, and impersonal tone that plague many multiauthored texts. I sought a compromise between a book that is too lengthy (and therefore expensive) as a result of excessive repetition and one in which all duplication is eliminated, resulting in fragmented coverage of certain subjects. Some material is repeated within the text, but this has been done deliberately for the convenience of the reader. For example, the chapter on echocardiography describes the application of this technique in valvular heart disease, while the chapter on valvular heart disease includes discussions of echocardiography relevant to the recognition and assessment of these disorders. Whenever such repetition would have proved unwieldy, extensive cross references have been provided within the text.

Particular emphasis has been placed on insuring a comprehensive and up-to-date bibliography; considerable revisions have been made in both galley and page proofs to accommodate information about recent advances in the field, and several hundred references to publications appearing late in 1979 and early in 1980 have been inserted.

To the extent that this book proves useful to those who wish to broaden their knowledge of cardiovascular medicine and thereby aids in the care of patients afflicted with heart disease, credit must be given to the many talented and dedicated persons involved in its preparation. I offer my deepest appreciation to my fellow contributors for their professional expertise, knowledge, and devoted scholarship, which has so enriched this book. For their cooperation and willingness to deal with a demanding editor I am deeply in their debt. My editorial and writing efforts were also greatly aided by a number of individuals whom I consulted about specific sections. Extremely helpful advice and constructive criticism were provided by Drs. Joseph S. Alpert, Elliott M. Antman, Stephen M. Ayres, William H. Barry, Edward H. Bergofsky, C. Gunnar Blómqvist, Jeffrey S. Borer, Mary Jo Burgess, Lawrence H. Cohn, Peter F. Cohn, David M. Dawson, Nabil El-Sherif, Charles Fisch, Michael D. Freed, William F. Friedman, Victor F. Froelicher, Edward D. Frohlich, Jonas B. Galper, Jacques Genest, Lee Goldman, William Grossman, E. William Hancock, Norman K. Hollenberg, Roland H. Ingram, David C. Levin, Victor A. McKusick, James Metcalfe, Robert G. Narins, Alan S. Nies, William V. Parmley, Oglesby Paul, Joseph K. Perloff, Kirk L. Peterson, Peter Reich, Eugene D. Robin, Arthur A. Sasahara, Ronald H. Selvester, Laurence J. Sloss, Harold S. Solomon, Madison S. Spach, Jerry S. Trier, Gerard M. Turino, Max H. Weil, Arnold M. Weissler, Harvey Wolinsky, Roland Wyatt, and Barry L. Zaret.

It has been a personal pleasure for me to deal with the W. B. Saunders Company. Mr. John Hanley, Vice President and Editor of Health Sciences, has been particularly helpful, and I deeply appreciate his wise counsel at several critical junctures. One of Mr. Hanley's most notable contributions to this book was his assignment of Ms. Diane Q. Forti to serve as Special Editor for this project. It is a pleasure to be able to acknowledge the collaboration of a true professional. Ms. Forti provided this book with editorial talents of a higher quality than I have ever encountered. Her unusual insight; very high standards; and insistence on accuracy, consistency, and clarity of expression improved enormously the large section of the book that she personally edited. She has left a positive and lasting imprint on this book that will certainly

be felt in subsequent editions. Ms. Katherine Arnoldi and Ms. Wynette Kommer of W. B. Saunders provided very able editorial support, while Ms. Patricia Kadlick in my office rendered most capable secretarial services.

Without question, this book could not have become a reality were it not for the skill and dedication of two very special persons. My responsibilities to the Harvard Medical School and the Peter Bent Brigham Hospital during my sabbatical year were shouldered most effectively by my friend and colleague Dr. Marshall Wolf, who provided the Department of Medicine with exemplary leadership during my absence. My administrative assistant, Mrs. Mary Jackson, expended incalculable time and effort to aid me in the completion of this project while at the same time maintaining the orderly flow of activity essential to a busy Department of Medicine. I am personally deeply indebted to both Dr. Wolf and Mrs. Jackson for going far beyond the call of duty, thereby permitting me to devote myself to *Heart Disease: A Textbook of Cardiovascular Medicine.*

EUGENE BRAUNWALD

CONTENTS

PART I EXAMINATION OF THE PATIENT

Chapter 1

THE HISTORY 3
Eugene Braunwald, M.D.

Chapter 2

THE PHYSICAL EXAMINATION 13
Eugene Braunwald, M.D.

Chapter 3

HEART SOUNDS Phonocardiography; Carotid, Apex, and Jugular Venous Pulse Tracings; and Systolic Time Intervals 39
Ernest Craige, M.D.

Chapter 4

ECHOPHONOCARDIOGRAPHY AND OTHER NONINVASIVE TECHNIQUES TO ELUCIDATE HEART MURMURS AND TO SOLVE DIAGNOSTIC PROBLEMS 70
Ernest Craige, M.D.

Chapter 5

ECHOCARDIOGRAPHY 96
Harvey Feigenbaum, M.D.

Chapter 6

RADIOLOGICAL AND ANGIOGRAPHIC EXAMINATION OF THE HEART 147
Murray G. Baron, M.D.

Chapter 7

ELECTROCARDIOGRAPHY AND VECTORCARDIOGRAPHY ... 198
Leo G. Horan, M.D., and Nancy C. Flowers, M.D.

Chapter 8

EXERCISE STRESS TESTING 253
L. Thomas Sheffield, M.D.

Chapter 9

CARDIAC CATHETERIZATION 278
William H. Barry, M.D., and William Grossman, M.D.

Chapter 10

CORONARY ARTERIOGRAPHY 308
Goffredo G. Gensini, M.D.

Chapter 11

RADIOISOTOPIC EXAMINATION OF THE CARDIOVASCULAR SYSTEM 363
B. Leonard Holman, M.D.

PART II ABNORMALITIES OF CIRCULATORY FUNCTION

Chapter 12

CONTRACTION OF THE NORMAL HEART 413
Eugene Braunwald, M.D., Edmund H. Sonnenblick, M.D., and John Ross, Jr., M.D.

Chapter 13

PATHOPHYSIOLOGY OF HEART FAILURE 453
Eugene Braunwald, M.D.

Chapter 14

ASSESSMENT OF CARDIAC PERFORMANCE 472
Eugene Braunwald, M.D.

Chapter 15

CLINICAL MANIFESTATIONS OF HEART FAILURE 493
Eugene Braunwald, M.D.

Chapter 16

THE MANAGEMENT OF HEART FAILURE 509
Thomas W. Smith, M.D., and Eugene Braunwald, M.D.

Chapter 17

PULMONARY EDEMA: CARDIOGENIC AND NONCARDIOGENIC FORMS 571
Roland H. Ingram, Jr., M.D., and Eugene Braunwald, M.D.

Chapter 18

CARDIAC AND NONCARDIAC FORMS OF ACUTE CIRCULATORY COLLAPSE (SHOCK) 590
Burton E. Sobel, M.D.

Chapter 19

MECHANISMS AND DIAGNOSIS OF ARRHYTHMIAS 630
J. Thomas Bigger, Jr., M.D.

Chapter 20

MANAGEMENT OF ARRHYTHMIAS 691
J. Thomas Bigger, Jr., M.D.

Chapter 21

THE USE OF CARDIAC PACEMAKERS 744
Doris J. W. Escher, M.D.

Chapter 22

CARDIOVASCULAR COLLAPSE AND SUDDEN CARDIAC DEATH 778
Bernard Lown, M.D.

Chapter 23

HIGH CARDIAC OUTPUT STATES 818
William Grossman, M.D., and Eugene Braunwald, M.D.

Chapter 24

PULMONARY HYPERTENSION 835
William Grossman, M.D., and Eugene Braunwald, M.D.

Chapter 25

SYSTEMIC HYPERTENSION: MECHANISMS AND DIAGNOSIS 852
Norman M. Kaplan, M.D.

Chapter 26

SYSTEMIC HYPERTENSION: THERAPY 922
Norman M. Kaplan, M.D.

Chapter 27

HYPOTENSION AND SYNCOPE 952
Burton E. Sobel, M.D., and Robert Roberts, M.D.

PART III DISEASES OF THE HEART, PERICARDIUM, AORTA, AND PULMONARY VASCULAR BED

Chapter 28

CONGENITAL HEART DISEASE IN INFANCY AND CHILDHOOD 967
William F. Friedman, M.D.

Chapter 29

CONGENITAL HEART DISEASE IN THE ADULT 1057
Joseph S. Alpert, M.D., and Eugene Braunwald, M.D.

Chapter 30

ACQUIRED HEART DISEASE IN INFANCY AND CHILDHOOD 1079
William F. Friedman, M.D.

Chapter 31

VALVULAR HEART DISEASE 1095
Eugene Braunwald, M.D.

Chapter 32

INFECTIVE ENDOCARDITIS 1166
Louis Weinstein, M.D.

Chapter 33

PRINCIPLES OF THE PATHOGENESIS OF ATHEROSCLEROSIS 1221
Robert W. Wissler, M.D.

Chapter 34

RISK FACTORS FOR CORONARY ARTERY DISEASE AND THEIR MANAGEMENT 1246
Robert I. Levy, M.D., and Manning Feinleib, M.D.

Chapter 35

CORONARY BLOOD FLOW AND MYOCARDIAL ISCHEMIA 1279
Eugene Braunwald, M.D., and Burton E. Sobel, M.D.

Chapter 36

PATHOLOGICAL AND CLINICAL MANIFESTATIONS OF ACUTE MYOCARDIAL INFARCTION 1309
Joseph S. Alpert, M.D., and Eugene Braunwald, M.D.

Chapter 37

MANAGEMENT OF ACUTE MYOCARDIAL INFARCTION 1353
Burton E. Sobel, M.D., and Eugene Braunwald, M.D.

Chapter 38

CHRONIC CORONARY ARTERY DISEASE 1387
Peter F. Cohn, M.D., and Eugene Braunwald, M.D.

Chapter 39

THE CARDIOMYOPATHIES AND MYOCARDITIDES 1437
Joshua Wynne, M.D., and Eugene Braunwald, M.D.

Chapter 40

PRIMARY TUMORS OF THE HEART 1501
Wilson S. Colucci, M.D., and Eugene Braunwald, M.D.

Chapter 41

DISEASES OF THE PERICARDIUM 1517
John R. Darsee, M.D., and Eugene Braunwald, M.D.

Chapter 42

TRAUMATIC HEART DISEASE 1583
Peter F. Cohn, M.D., and Eugene Braunwald, M.D.

Chapter 43

DISEASES OF THE AORTA 1597
Eve E. Slater, M.D., and Roman W. DeSanctis, M.D.

Chapter 44

PRIMARY PULMONARY HYPERTENSION 1633
Joseph S. Alpert, M.D., and Eugene Braunwald, M.D.

Chapter 45

COR PULMONALE AND PULMONARY THROMBOEMBOLISM 1643
E. Regis McFadden, Jr., M.D., and Eugene Braunwald, M.D.

PART IV HEART DISEASE AND DISEASES OF OTHER ORGAN SYSTEMS

Chapter 46

GENETICS AND CARDIOVASCULAR DISEASE 1683
Joseph L. Goldstein, M.D., and Michael S. Brown, M.D.

Chapter 47

CONNECTIVE TISSUE DISEASES OF THE CARDIOVASCULAR SYSTEM 1723
Gene H. Stollerman, M.D.

Chapter 48

HEMATOLOGIC-ONCOLOGIC DISORDERS AND HEART DISEASE 1771
David S. Rosenthal, M.D., and Eugene Braunwald, M.D.

Chapter 49

NEUROLOGICAL DISORDERS AND HEART DISEASE 1801
Joseph K. Perloff, M.D.

Chapter 50

ENDOCRINE AND NUTRITIONAL DISORDERS AND HEART DISEASE 1825
Gordon H. Williams, M.D., and Eugene Braunwald, M.D.

Chapter 51

RENAL DISORDERS AND HEART DISEASE 1854
Michael N. Gottlieb, M.D., and Eugene Braunwald, M.D.

Chapter 52

PREGNANCY AND CARDIOVASCULAR DISEASE 1871
Joseph K. Perloff, M.D.

Chapter 53

RELATIONSHIP BETWEEN DISEASES OF THE HEART AND LUNGS 1893
E. Regis McFadden, Jr., M.D., and Roland H. Ingram, Jr., M.D.

Chapter 54

GENERAL ANESTHESIA AND NONCARDIAC SURGERY IN PATIENTS WITH HEART DISEASE 1911
Marshall A. Wolf, M.D., and Eugene Braunwald, M.D.

Chapter 55

EMOTION, PSYCHIATRIC DISORDERS, AND THE HEART 1923
Thomas P. Hackett, M.D., and Jerrold F. Rosenbaum, M.D.

INDEX i

Part I

EXAMINATION OF THE PATIENT

1

THE HISTORY

by
EUGENE BRAUNWALD, M.D.

IMPORTANCE OF THE HISTORY: THE PHYSICIAN'S ROLE, p. 3
PRINCIPAL SYMPTOMS OF HEART DISEASE, p. 4
Dyspnea, p. 4
Chest Pain or Discomfort, p. 5
Cyanosis, p. 7
Syncope, p. 7
Palpitation, p. 9
Edema, p. 9
Cough, p. 10
Hemoptysis, p. 10
THE HISTORY IN SPECIFIC FORMS OF HEART DISEASE, p. 10
GENERAL REFERENCES, p. 12

IMPORTANCE OF THE HISTORY: THE PHYSICIAN'S ROLE

Specialized examinations of the cardiovascular system, presented in Chapters 3 to 11, provide a large portion of the data base required to establish a specific anatomical diagnosis of cardiac disease and to determine the extent of functional impairment of the heart. Although the development of these methods represents one of the triumphs of modern medicine, their appropriate use is *to supplement but not to supplant* a careful clinical examination, which remains the cornerstone of the assessment of the patient with known or suspected cardiovascular disease. There is a temptation in cardiology, as in many other areas of medicine, to carry out expensive, uncomfortable, and occasionally even hazardous procedures to establish a diagnosis when a detailed and thoughtful history and physical examination may be sufficient. Obviously, it is undesirable to subject patients to the unnecessary risks and expenses inherent in many specialized tests when a diagnosis can be made based on an adequate clinical examination, or when their management will not be altered significantly as a result of these tests. Intelligent selection of investigative procedures from the broad array now available requires more sophisticated decision-making than was necessary when the choices were limited to the electrocardiogram and chest roentgenogram. The history and physical examination provide the critical information necessary for these decisions.

The overreliance on laboratory tests has increased as physicians attempt to utilize their time more efficiently by delegating responsibility for taking the history to a physician's assistant or nurse or even by issuing a questionnaire—an approach that I consider to be an undesirable trend insofar as the patient with known or suspected heart disease is concerned. First of all, it must be appreciated that the history remains the richest source of information concerning the patient's illness, and any practice that might diminish the quality of information provided by the history could ultimately impair the quality of care. Second, the physician's attentive and thoughtful taking of a history establishes a bond with the patient that may be valuable later in securing the patient's compliance in following a complex treatment plan, undergoing hospitalization for an intensive diagnostic work-up or a hazardous operation, and, in some instances, accepting that heart disease is not present at all. It is largely through the direct contact established between the patient and physician during the clinical examination that this confidence can best be established.

Taking a history also permits the physician to evaluate the results of diagnostic tests that have strong subjective components, such as the determination of exercise capacity (see p. 261). Perhaps most importantly, a careful history allows the physician to evaluate the impact of the disease, or the fear of the disease, on the patient's total life and to assess the patient's personality, emotion, and stability; often it provides a glimpse of the patient's responsibilities, fears, aspirations, and threshold for discomfort as well as the likelihood of compliance with one or another therapeutic regimen. Whenever possible, the physician should question not only the patient but also relatives or close friends of the patient in order to obtain a clearer understanding of the extent of the patient's disability and a broader perspective concerning the impact of the disease on both the patient and the family.

In interpreting the history obtained from a patient with known or suspected heart disease it must be appreciated that the combination of the widespread fear of cardiovascular disorders and the deep-seated emotional and sometimes even religious connotations concerning this organ's function often provokes symptoms that mimic those of organic heart disease in persons with normal cardiovascular systems. Functional complaints referable to the cardiovascular system may also develop in patients with organic heart disease. The unraveling of symptoms and signs due to organic heart disease from those not directly related to it is an important and challenging task, and the history is the most valuable tool in carrying out this task.