Contemporary Cardiology
Series Editor: Peter P. Toth

Todd J. Cohen
Roger S. Blumenthal *Editors*

Surviving and Thriving With Heart Disease

Humana Press

Contemporary Cardiology

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For more than a decade, cardiologists have relied on the Contemporary Cardiology series to provide them with forefront medical references on all aspects of cardiology. Each title is carefully crafted by world-renown cardiologists who comprehensively cover the most important topics in this rapidly advancing field. With more than 75 titles in print covering everything from diabetes and cardiovascular disease to the management of acute coronary syndromes, the Contemporary Cardiology series has become the leading reference source for the practice of cardiac care.

Todd J. Cohen • Roger S. Blumenthal
Editors

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Foreword

Heart disease presents as a spectrum from the minor condition to be monitored to the catastrophic event requiring major interventions. When my uncle died at age 76 while playing basketball, he had known of his heart disease for many years and been treated with medications allowing him to continue his favorite weekly event with his friends. I remembered as a youngster he played basketball once a week with his friends and that was a time not to disturb him or plan family events if you expected his presence. Good medical management of his disease allowed him to continue what he loved to do for many years. Today a minimally invasive procedure would have extended his life even longer.

Often when we think of heart disease, we imagine someone quietly sitting on a sofa, walking slowly to another room, and resting once again. Nothing could be further from the truth for the vast majority of patients with heart disease! Today's medical treatments, minimally invasive procedures, and imaging capabilities allow most patients to pursue their hobbies and dreams.

One of my triathlon mentors finished an ironman triathlon after bypass surgery, and one of my family members is enjoying life after a heart transplant! As a physician who has treated patients for over 30 years, I have seen the evolution of this incredible heart care. Giving patients, and their families and friends, their life back is what this is all about.

Dr. Cohen's subject knowledge and his access to specialists give this book the depth it needs, while his understanding of patient care and patients' needs add the important aspects of relevance and readability.

Use this book not only as a resource to expand your knowledge but also as an inspiration to follow your path and your dreams.

Jerry Balentine
President and Chief Executive Officer
New York Institute of Technology,
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Preface by Todd J. Cohen

This book is the logical expansion and update to my 2010 Johns Hopkins Health book entitled "A Patient's Guide to Heart Rhythm Problems." It updates and expands on the mission of empowering those with *heart rhythm problems* to help all patients (including their families and friends) *survive and thrive with heart disease*. It does this by not only including broader heart disease related topics, and including the traditional diet, exercise, and lifestyle modifications, but by being more holistic, and giving the reader tips on how to survive, and more importantly thrive! I really appreciated the help of the many healthcare contributors (see Book Contributors) who provided a fresh perspective on heart disease and its current management.

I dedicate this book to all patients with heart disease that need treatment. Various sources of information have been available to you over the years, including magazine articles, pamphlets (often provided by the manufacturers of drugs or implantable devices), and information your physician has provided in discussing your condition and treatment. This book is another source of information. The original "Patient's Guide…" I used in this manner, often giving it to doctors and patients as an educational resource. This newer and expanded book is even more important in this regard.

How does the new book differ from its predecessor? It presents basic concepts of how the normal heart functions, and then expands on these concepts to discuss abnormalities in heart (heart disease) along with their consequences. It discusses tests and studies used in diagnosing heart disease and teaches the reader to know their numbers so they can understand the importance of their heart rate, blood pressure, weight, cholesterol, blood sugar, and their ejection fraction (EF). This is a recurrent theme throughout the book, and Appendix I gives the reader the opportunity to write down and track their numbers and visually see how they change. Finally, the book describes the treatments and prevention measures. In other words, how to survive and more importantly *thrive* with heart disease!

In order to take advantage of the latter, this book pulls in the expertise of some of my wisest and most skilled colleagues that I have turned to help and assist my patients. This book not only will help the reader understand the basic heart tests and

The original version of the book has been revised. A correction to this book can be found at https://doi.org/10.1007/978-3-032-00579-3_56

treatments but will also expose them to a wider array of treatments including lifestyle modifications, mindfulness, osteopathic as well as allopathic medicine, and alternative therapies.

I have learned from the thousands of patients that I have had the privilege of treating over the years that the ability to adapt to life's changes is a very important factor in order to thrive. One of my patients (referred to in this book) wrote a song that reflects on a method of this flexibility, called "Plan B." It is featured in this book and should be taken to heart (pun intended). The idea of always having alternative plans, when things change or don't work out, has given this patient (and many others) the ability to go with the flow and find even better ways to continue successfully down the pathway of life.

My intention in this book is to provide background to help patients understand their diagnosis, any tests they may undergo, and how doctors might treat the problem. Illustrations and tables are provided to clarify the concepts.

Always ask questions. There is usually an opportunity before any procedure for your doctor and his or her team to answer all your questions and to make sure you are entirely comfortable before proceeding. What is best for you must be considered individually. It is with all these factors in mind that I wrote this book, as a resource for patients, their families, and their loved ones. I hope it helps you gain further understanding of your condition, and not to be redundant, I hope it helps you survive and thrive!

Todd J. Cohen
New York, NY, USA

Preface by Roger S. Blumenthal

Cardiovascular disease or CVD (heart attack, stroke, heart failure, peripheral arterial disease, and arrhythmias such as atrial fibrillation) is the leading cause of death in North America and Europe. Nearly all of the persons who develop CVD have at least one major traditional risk factor and very few have optimal lifestyle habits that are the foundation of prevention. All of us should strive to consume a healthy diet that emphasizes the intake of fruits, vegetables, nuts, whole grains, and fish and engage in at least 150 minutes per week of moderate-intensity physical activity. It is best to minimize trans fats, processed meats, refined carbohydrates, and sweetened beverages. One should also try to replace saturated fats with monounsaturated and polyunsaturated fats and reduce dietary cholesterol and sodium.

Healthcare professionals should identify individuals who are overweight or obese and provide counseling (or refer to other specialists) on comprehensive lifestyle interventions such as caloric restriction and better exercise habits. Individuals who use tobacco products should be assisted and strongly urged to quit. Cardiovascular prevention takes a village, and this great book is a great way to lower your risk of a future cardiovascular event. It was a pleasure to work with my college classmate Dr. Todd Cohen on this project.

Roger S. Blumenthal
Baltimore, MD, USA

Acknowledgments

First, I want to thank all of my patients who made a contribution in one way or another to this book. Some of you added to my experience, such as “Plan B.” Others wrote personal cases, which emphasize key points, like how to not only survive but to thrive. Second, I want to thank my coauthor, Dr. Roger S. Blumenthal, Professor of Medicine and Director of the Johns Hopkins Ciccarone Center for the Prevention of Cardiovascular Disease at the Johns Hopkins Hospital for his helpful insights into the field of cardiology and preventive health. He helped pull this book together and make it a useful tool for all patients and their families and friends. Third, I give a special thanks to all those practicing physicians and healthcare workers who contributed significantly to this broad layperson's heart book (listed below; Book Contributors). Fourth, I want to thank Michael Zierler, Science Writer/Editor, for his helpful comments and edits. Fifth, I also want to thank the many great New York Institute of Technology College of Medicine faculty and medical students (who are now physicians) who helped organize the illustrations, permissions, and a myriad of other tasks. I want to thank Dr. Ermin Tale, as well as fourth-year medical student Demetra Menoudakos, for their assistance with the book's final update and editing. Sixth, thanks to my engineering team for developing the “Create your Surviving and Thriving Card” button on my practice’s website: www.liheartrhythmceneter.com. Seventh, I wish to acknowledge with gratitude the contributions of Terri Sepalla and Jeffrey Mizel, whose involvement was completed prior to their passing. Lastly, thanks to our Provost and Executive Vice President, Dr. Jerry Balentine, for his encouragement and support during this process. New York Tech is a wonderful place, and he sets an inspirational example for the rest of us at the medical school.

Sincerely,

Todd J. Cohen MD, Distinguished Professor – Clinical Specialties, Chief of Cardiology, Director of Medical Device Innovations, New York Institute of Technology College of Osteopathic Medicine

Introduction

Case 1: Surviving and Thriving

I was taking a stress test at the Hofstra Health Dome in 1987. I had lost 80 pounds and needed clearance to begin a workout regimen. I passed with flying colors; 15 minutes later, my life changed forever. I had a massive MI and "coded" on the way to the hospital. Did I mention I was 35 years old, with two little boys and a beautiful wife? Luck was on my side and I survived. It changed my life, but I went on.

I did fine until 1997, maybe too fine. My weight ballooned to 360 pounds. My legs hurt and I couldn't breathe. Heart failure was now my enemy. More than anything else, I wanted not to die.

I lost 170 pounds and my face was on cereal boxes in supermarkets (Fig. 1, actual Kashi Cereal box showing a leaner meaner me—Jeffrey Mizel). I loved life and my family. Not a chance I would not survive. Did I mention I developed Diabetes? Oh, I also was diagnosed with a heart rhythm problem (arrhythmia), and a pacemaker/defibrillator was a new improvement.

While seeing an endocrinologist, thyroid nodules were found. Of course, they were malignant, and surgery was next.

To this day, after several rounds of thyroid cancer (not to mention cancer of my left kidney that required part of that kidney to be removed), my wife and I never skipped a beat. We would just say it was another adventure. We would just deal with it and go on. By the way, I found time for four melanoma skin cancer surgeries on my back as well as spine surgeries on my neck and lower back. Somehow a bout with septic shock happened as well. Good news is I am learning to walk again and getting better at it.

Although I have had many adventures to date, I am alive and loving every second. I live for my beautiful wife who has supported all my adventures, two sons, two beautiful daughters-in-law and the highlight of my world, four awesome grandchildren. Not to be forgotten, I have a team of doctors who are always there for me.

Life is awesome!

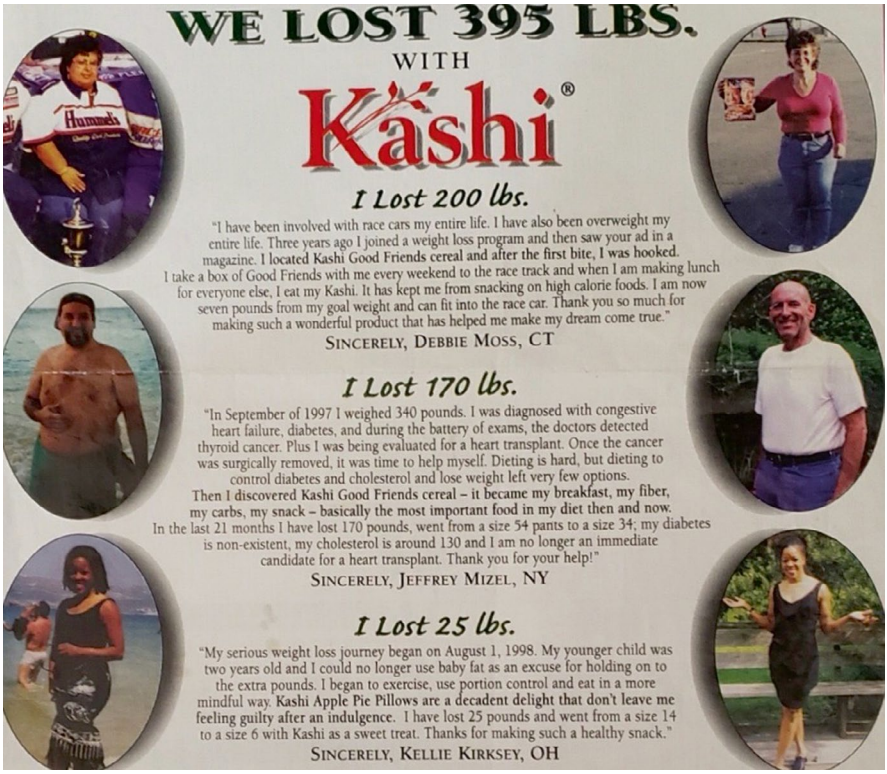

Fig. 1 The actual cereal box that capitalized on my weight loss, a means to surviving and thriving with my heart disease

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Editors and Contributors

About the Editors

Todd J. Cohen, MD is a triple-boarded (Johns Hopkins, Stanford, and UCSF trained) inspirational cardiologist, inventor, entrepreneur, and educator. After witnessing his grandfather suffering a heart attack, receiving a pacemaker implant, and eventually succumbing to heart disease, he dedicated his life to advancing the field of cardiology.

With over 300 publications, his articles have appeared in journals such as the *New England Journal of Medicine*, *JAMA*, and *Circulation*; his books include a Library Journal Best Consumer Health Book entitled *A Patient's Guide to Heart Rhythm Problems* (Johns Hopkins Press, 2010), a trade book entitled *Practical Electrophysiology, Third Edition* (HMP Communications, LLC, 2016), and a fictional novel entitled *Pollock No. 5* (Black Opal Books, 2021). He has 38 issued U.S. patents and has licensed and/or sold inventions to several leading companies in the field of electrophysiology, catheter ablation, implantable devices, and robotics.

Dr. Cohen built and directed two of the busiest EP programs on Long Island (North Shore Univ. and Winthrop Univ. Hospitals). He is currently the Chief of Cardiology, Director of Medical Device Innovation, and a Distinguished Professor at NYIT in Old Westbury, New York. He is the Director and Founder of the Long Island Heart Rhythm Center (www.liheartrhythmcenter.com) and an attending physician at Mt. Sinai Morningside in New York City. He recieved the AOA Innovations Research Award twice, the NYSOMS Distinguished Service Award, and is a Fellow in the

National Academy of Inventors. He has a passion for art and is the President of the Board of Trustees and Chairman of the Art and Exhibition Committee at the Nassau County Museum of Art, in Roslyn, New York.

Roger S. Blumenthal, MD is the principal developer and Director of The Johns Hopkins Ciccarone Center for the Prevention of Cardiovascular Disease. The comprehensive clinical and translational research program is named after former Johns Hopkins Lacrosse Coach Henry Ciccarone, who guided the Hopkins Blue Jays to a record seven straight NCAA championship games and three straight national titles. Coach Ciccarone died of sudden cardiac arrest in November 1988 following two heart attacks in the prior 2 years. He was the coach of Johns Hopkins when Drs. Cohen and Blumenthal attended the university.

Dr. Blumenthal is the Kenneth Jay Pollin Professor of Cardiology. He received his medical degree from Cornell Medical College, where he was awarded the Weiss Prize for Excellence in Clinical Medicine. He then did his Internal Medicine and Cardiology Fellowship training at Johns Hopkins before joining the faculty. He received the 2019 Society of Cardiovascular Computed Tomography (SCCT) Arthur S. Agatston Cardiovascular Disease Prevention Award.

Together with Dr. Mariell Jessup, he was co-chair of the American College of Cardiology/American Heart Association (ACC/AHA) subcommittee that oversaw the updates of all the Prevention-related guidelines (Blood Pressure, Cholesterol, Risk Assessment). Dr. Donna Arnett and he were co-chairs of the 2019 ACC/AHA Primary Prevention of Cardiovascular Disease Guideline.

In *Surviving and Thriving with Heart Disease*, Drs. Cohen and Blumenthal utilize their passion for healing and put together a “one-of-a-kind” empowering book that can help all patients and their friends and families learn how to “survive and thrive” with heart disease.

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Jeffrey Mizel (1951–2022) contributed to this book before his passing
Terri Sepalla (1947–2024) contributed to this book before her passing

Part I

The Basics

This part of the book will provide you and those you care about with the information needed to understand how the heart works. Read it and ask questions when you see your doctor. The more you know, the better you will understand why certain tests are being ordered or what treatments are being suggested. This book is intended to give you the tools so that you are empowered and can take control of your own heart health.

1 Overview: Your Heart

Todd J. Cohen

In order to understand heart disease, you first need a basic understanding of your heart. Your heart is a muscular structure, located in the middle of your chest, that pumps blood throughout your body. It is a vital organ with both electrical and mechanical components. The electrical system produces the rhythm, and the mechanical components provide the pumping. Mechanically, the heart has four chambers and four valves, as shown in Fig. 1.1. The heart consists of two upper chambers and two lower chambers. Each upper chamber is called an *atrium* (right atrium and left atrium). Together, these chambers are called the *atria*. They *receive* blood, which is then pumped into the lower chambers. The lower chambers, called the *ventricles, pump* blood to the lungs (right ventricle) and to the rest of the body (left ventricle).

The electrical system (which is also called the conduction system) tells the heart (and its chambers) when and in what sequence it should contract and relax to pump blood to the rest of the body (Fig. 1.2). The electrical impulses begin high up in the right atrium, in a structure called the *sinus,* or *sinoatrial, node* (SA node). A node is defined as a beginning structure or a point for electrical signals to come together and then be redirected to another region in the heart. There are two nodes in the heart:

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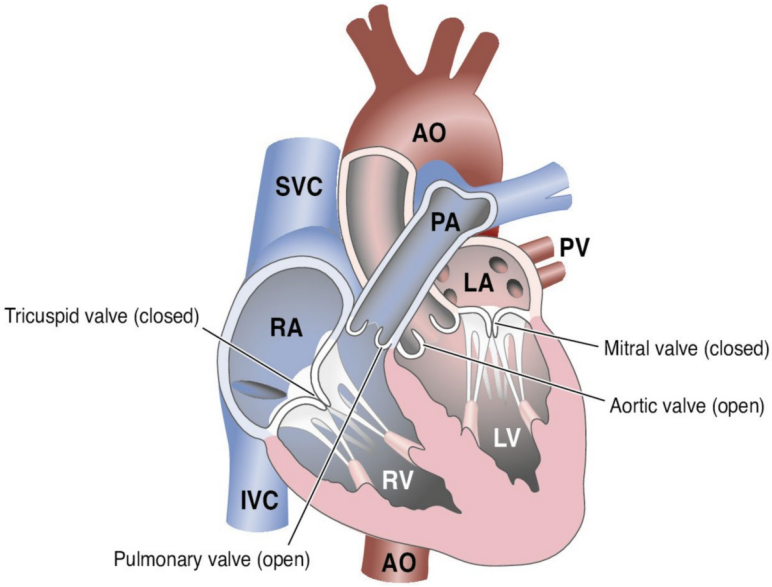

Fig. 1.1 The structure of the heart—its chambers, valves, and great vessels. AO aorta, IVC inferior vena cava, LA left atrium, LV left ventricle, PA pulmonary artery, PV pulmonary veins, RA right atrium, RV right ventricle, SVC superior vena cava. (See also color version.)

the SA node and the *atrioventricular node* (AV node). Impulses move from the SA node across the atrial structures to the AV node (located in the middle of the heart, between the atria and ventricles). A small delay in the electrical signal typically occurs in the AV node before the impulse travels to a specialized conduction bundle (called the *His bundle*); it then moves down through the right and left bundles to specialized *Purkinje fibers* before activating the ventricles.

The presence of disease in any of the specialized electrical conducting tissues may disrupt the flow of electricity through the heart, slowing or pausing the heart rate. When the heart rate is too slow, a person may develop symptoms and may need to have a pacemaker surgically implanted to correct the problem. Disease inside or outside the specialized cardiac conduction tissue can also result in fast heart rhythm problems that might require treatment with medications, catheter ablation (a procedure that identifies the heart rhythm abnormality and destroys specific tissue to cure the rhythm problem), or an implantable device such as a defibrillator (see Part V).

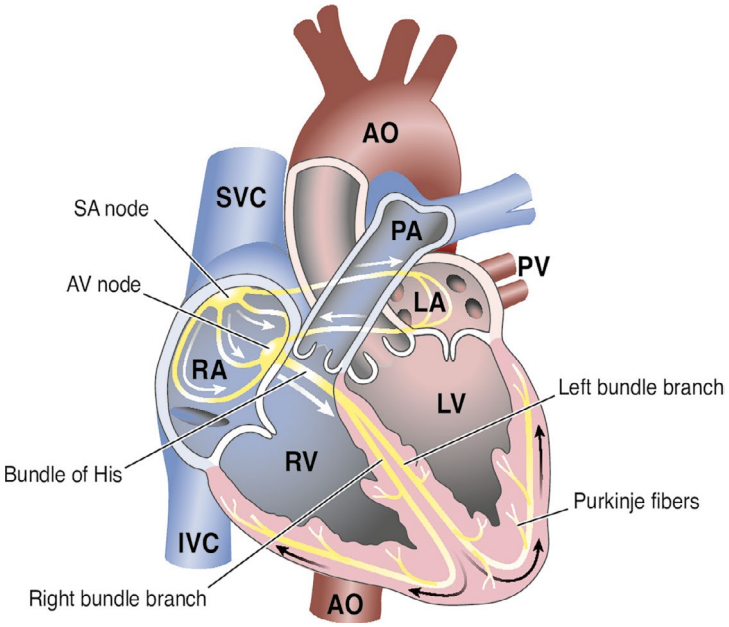

Fig. 1.2 The conduction system of the heart. The arrows show the electrical impulses, which begin in the sinus node and travel through the atria to the atrioventricular node. After a slight delay there, these impulses are conducted through the His bundle and through the right and left bundle branches to the Purkinje fibers, which carry the impulses into the ventricles. AO aorta, AV node atrioventricular node, IVC inferior vena cava, LA left atrium, LV left ventricle, PA pulmonary artery, PV pulmonary veins, RA right atrium, RV right ventricle, SA node sinus node, SVC superior vena cava. (See also color version.)

Blood Movement Through the Heart

Blood flow through the healthy heart's chambers should be smooth and rhythmic. The right side of the heart receives deoxygenated blood (devoid of oxygen) from the rest of the body via two large veins, called the *superior vena cava* and *inferior vena cava* (Fig. 1.3). Blood enters the right atrium and travels through the tricuspid valve to the right ventricle. Then it is pumped out the pulmonary valve through the pulmonary artery into the lungs, where oxygen is put into the blood. Oxygenated blood returns through pulmonary veins to the left side of the heart and into the left atrium. The blood then travels across the mitral valve into the left ventricle and is pumped out through the aortic valve into the aorta and then to the rest of the body.

The heart itself is nourished through the coronary arteries, which arise from the proximal (first part of the) aorta. The coronary arteries consist of a left coronary artery (which branches into the left anterior descending and the left circumflex

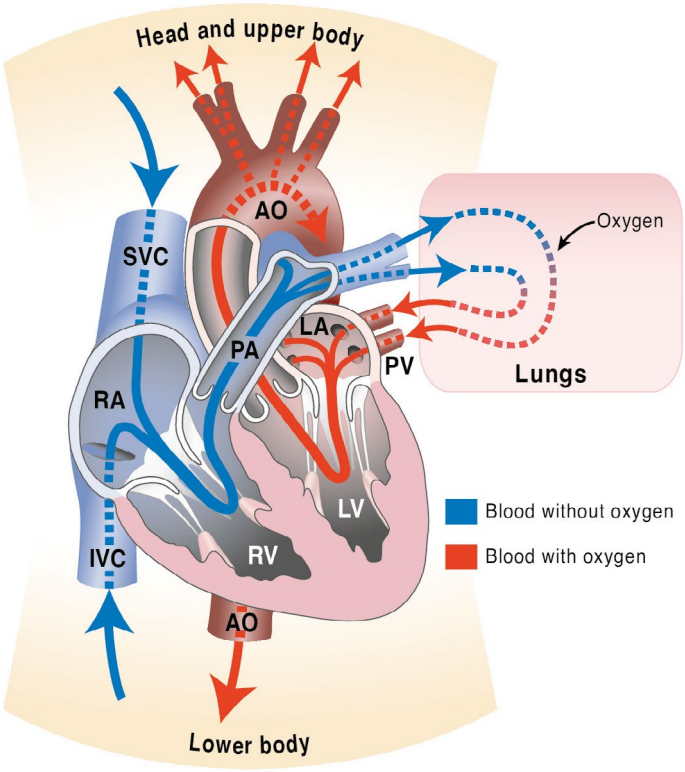

Fig. 1.3 The sequence of circulation. The blue arrows show blood deprived of oxygen (deoxygenated blood) returning to the right side of the heart. The blood is then pumped to the lungs to receive oxygen. Oxygenated blood, indicated by red arrows, returns to the heart via the pulmonary veins and is then pumped from the left side of the heart to the rest of the body. AO aorta, IVC inferior vena cava, LA left atrium, LV left ventricle, PA pulmonary artery, PV pulmonary veins, RA right atrium, RV right ventricle, SVC superior vena cava. (See also color version.)

Table 1.1 Heart facts

The heart is a four-chambered muscular structure.
It is about the size of your fist but can get much larger with disease.
It pumps 1,500 gallons of blood each day.
It normally beats at a rate of 60 to 100 times per minute (your heart rate).
It beats about 100,000 times per day and 36 million times per year.
Heart muscle does not usually regenerate.

coronary arteries) and a right coronary artery. Blockages (or moderate narrowings) in these arteries (or in their branches) may lead to a lack of blood flow and oxygenation of heart tissue (called *ischemia*). When the blockage is severe and lasts long enough (usually following plaque rupture), the person may have a heart attack (also called a *myocardial infarction*; see Chap. 11). For a summary of basic facts about the heart, see Table 1.1.

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