Evidence-Based Cardiology

Third Edition

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EVIDENCE-BASED CARDIOLOGY

THIRD EDITION

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PREFACE

Perhaps more than any other field of medicine, advances in cardiology are guided by data from large clinical trials. The number of major trials evaluating pharmacologic agents and diagnostic and therapeutic procedures continues to undergo significant growth. Since the publication of the previous edition of *Evidence-Based Cardiology*, results of hundreds of major trials have been published.

The two primary goals of *Evidence-Based Cardiology* are to (1) systematically summarize the major trials and (2) provide an overview of the field that integrates all the major trials and guidelines, thereby placing the information from the annotated studies in context. The results of major randomized trials in six major topic areas are presented in systematic fashion, including the design, study population, treatment regimen, results and when needed, additional perspective; some older trials and reviews have been eliminated and newer studies have replaced them. We have included selected meta-analyses, major review articles, and on occasion nonrandomized studies on important topics, usually with more abbreviated summaries. Importantly, the chapter overviews preceding the annotated references have been expanded with particular attention to discussing relevant ACC/AHA Practice Guidelines.

Chapter 1 focuses on preventive cardiology, particularly lipid and diet management, but also each of the multiple risk factors for coronary artery disease. There have been many advances included here. Chapter 2 focuses on major revascularization procedures, primarily coronary artery stenting and bypass surgery. New material includes data on drug-eluting stents and other novel devices. Chapters 3 and 4 cover the wealth of data on acute coronary syndromes. New material includes trial data on new antiplatelet and anticoagulant options for ACS, and a wealth of new studies on invasive strategy in STEMI patients. Chapter 5 focuses on the pharmacologic management of heart failure, with expanded information on biventricular pacing for CHF. Chapter 6 has been greatly expanded to include over 50 new trials, both in atrial fibrillation with new medications, novel strategies, and ablation procedures and in ventricular arrhythmias with expanded information on new drugs and implantable cardioverter defibrillators (ICDs).

We wish to acknowledge the coauthors of Chapters 5 and 6 (Justin M. Dunn and Jonathan Walter Dukes), who provided extensive assistance in revising, updating, and expanding these two chapters. We hope that the new edition will be helpful to you in staying up to date on the latest in evidence-based cardiology, and thereby help improve the management of patients.

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The authors wish to acknowledge the work of Dr. Peter Sharis who was a coauthor of the previous edition, and as such a contributor to this volume.

CONTENTS

CHAPTER 1

Preventive Cardiology: Risk Factors for Coronary Artery Disease and Primary and Secondary Prevention Trials

Christopher P. Cannon and Benjamin A. Steinberg

CHOLESTEROL, LIPIDS, AND DIET

Epidemiology

An estimated 107 million Americans have elevated total cholesterol (TC) levels, and based on the new National Cholesterol Education Program (NCEP) III guidelines, 37 million (one in five adults) are eligible for cholesterol-lowering therapy. A 10% decrease in TC is associated with an approximately 10% to 15% lower coronary heart disease (CHD) mortality rate and an approximately 20% decrease in the risk of myocardial infarction (MI). When TC levels are reduced by lifestyle modification (e.g., diet, exercise) and/or pharmacologic intervention, more benefit is derived in younger individuals, and the full benefits of a sustained decrease are not achieved for at least 5 years. Very low TC levels have been associated with higher mortality rates than those found with normal TC levels; however, this is likely owing to the higher prevalence of cancer in such individuals. Cardiac risk tables have been created to estimate the risk of CHD death at various cholesterol levels and in combination with other major CRFs. The NCEP III guidelines use modified Framingham risk score tables to estimate the 10-year CHD risk (see **Table 1.1**).

Low-density lipoprotein (LDL) has been shown in several studies, including the Framingham Heart Study, Multiple Risk Factor Intervention Trial (MRFIT), and Lipid Research Clinics (LRC) trial, to be a stronger predictor of CHD than TC. In fact, for every 30 mg/dL rise in LDL-C above 40 mg/dL, relative risk for coronary artery disease (CAD) increases by 30% (*Circulation* 2004;110:227). As a result, LDL levels are the primary focus of the NCEP III guidelines and their subsequent update. Of note, recent evidence suggests that C-reactive protein (CRP), a marker of inflammation, can provide additional prognostic information beyond that of LDL (see page 25).

High levels of high-density lipoproteins (HDLs) are associated with a decreased risk of CHD mortality; a 1% lower HDL-C is associated with a 2% to 3% higher CHD risk (17). The NCEP III guidelines now consider a low HDL level as less than 40 mg/dL (vs. less than 35 mg/dL in NCEP II) an indicator of

TABLE 1.1 Estimate of 10-Year Coronary Heart Disease Risk for Men and Women (Framingham Point Scores)

1. Age (yr)					
20–34: −9/–7					
35–39: −4/–3					
40–44: 0/0					
45–49: 3/3					
50–54: 6/6					
55–59: 8/8					
60–64: 10/10					
65–69: 11/12					
70–74: 12/14					
75–79: 13/16					
2. Total Cholesterol mg/dL	**Age 20–39 yr**	**Age 40–49 yr**	**Age 50–59 yr**	**Age 60–69 yr**	**Age 70–79 yr**
<160	0/0	0/0	0/0	0/0	0/0
160–199	4/4	3/3	2/2	1/1	0/1
200–239	7/8	5/6	3/4	1/2	0/1
240–279	9/11	6/8	4/5	2/3	1/2
≥280	11/13	8/10	5/7	3/4	1/2
3. Smoking Status	**Age 20–39 yr**	**Age 40–49 yr**	**Age 50–59 yr**	**Age 60–69 yr**	**Age 70–79 yr**
Nonsmoker	0/0	0/0	0/0	0/0	0/0
Smoker	8/9	5/7	3/4	1/2	1/1
4. HDL (mg/dL)					
>60: −1/−1					
50–59: 0/0					
40–49: 1/1					
<40: 2					
5. Systolic BP mm Hg	**If Untreated**	**If Treated**			
<120	0/0	0/0			
120–129	0/1	1/3			