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CARDIOLOGY  
FOUNDATION

# Atrial Fibrillation Clinical Management Update & Future Trends

Clinical Cardiology  
Series

2011 Edition

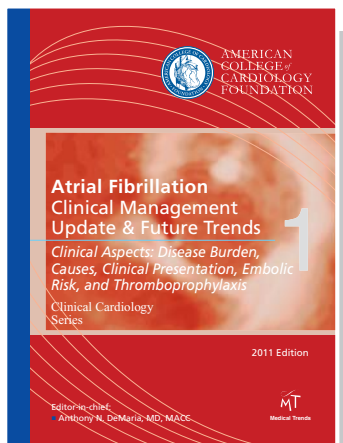
Editor-in-chief:  
■ Anthony N. DeMaria, MD, MACC



Medical Trends



# Atrial Fibrillation Clinical Management Update and Future Trends



**VOLUME 1**



**VOLUME 2**



**VOLUME 3**

# ■ Editors' Note

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We welcome you to **Atrial Fibrillation: Clinical Management Update and Future Trends**, a program belonging to the ACC Clinical Cardiology Series.

In this work, we have endeavored to bring you a thorough but manageable compilation on Atrial Fibrillation, a subject which has commanded rapidly growing attention in recent years.

The substantial volume of information appearing every year online, in medical literature and the major congresses is a major drawback that keeps most busy clinicians from being updated on all the new data and evaluating the real importance of each new piece of evidence and information.

In this sense, the Clinical Cardiology Series has been developed with individual programs that summarize, among the most recently published clinical information, that knowledge that the clinicians must know in order to be aware of the most recent advances in the pathology. The selection of this information has been trusted to a major expert assigned by the American College of Cardiology, and the major weight of the contents consists of official information generated by the ACC, with a warranty for scientific rigour and transcendence.

We have divided the content into three volumes, covering burden of disease and risk assessment first, then diagnostic aspects, and finally therapeutic approaches, both lifestyle and pharmacologic.

Each of these three sections will commence with an overview of the current state of knowledge drawn from primary publications by recognized leading experts in the field. They include the text of the most pertinent review articles on these subjects, a more extensive bibliography of other important articles, and a thorough presentation of practice guidelines and other cornerstones of evidence, which would logically influence a practitioner's approach to patients.

In putting these volumes together, we have tried to prepare the materials in a fashion that will allow you to encompass the current state of knowledge in this important subject at a pace and in an order that fits most appropriately with the busy clinician's schedule and preferred manner of learning.

The print version of each program is supplemented by an online version. Every reader will be provided with an access password to the site, where all the core information of the program will be included, plus constantly updated editorials, reviews, articles, video presentations, clinical cases, and more, all in a very selective and periodical manner, guided by a well-reputed expert in the clinical area.

We hope you find ACC's Atrial Fibrillation: Clinical Management Update and Future Trends a useful tool in providing you with the best current thinking to help manage your patients successfully.

The contents of this program may include information regarding the use of products that may be inconsistent with or outside the FDA approved labeling for these products in the United States. Physicians should note that the use of these products outside current approved labeling is considered experimental and they are advised to consult the prescribing information for these products.

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Clinical Cardiology Series  
**Atrial Fibrillation**  
Clinical Management Update and Future Trends

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Edited by Medical Trends

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Anthony N. DeMaria, MD, MACC

# ■ Contents

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## *Clinical Aspects: Disease Burden, Causes, Clinical Presentation, Embolic Risk, and Thromboprophylaxis*

# 1

- Judith A. Mackall, MD, FACC

### **Atrial Fibrillation and Atrial Flutter**

*Upon completion of this module, the reader will be able to: 1) explain the differences and similarities between atrial fibrillation (AF) and atrial flutter (AFL); 2) relate the current anticoagulation guidelines for AF and AFL; 3) differentiate between the treatment options of rate versus rhythm control for AF, and 4) identify the nonpharmacologic management of AF.*

- Valentin Fuster, MD, PhD, FACC, FAHA, FESC, Co-Chair;  
Lars E. Rydén, MD, PhD, FACC, FESC, FAHA, Co-Chair; David S. Cannom, MD, FACC;  
Harry J. Crijns, MD, FACC, FESC; Anne B. Curtis, MD, FACC, FAHA;  
Kenneth A. Ellenbogen, MD, FACC; Jonathan L. Halperin, MD, FACC, FAHA;  
Jean-Yves Le Heuzey, MD, FESC; G. Neal Kay, MD, FACC; James E. Lowe, MD, FACC;  
S. Bertil Olsson, MD, PhD, FESC; Eric N. Prystowsky, MD, FACC;  
Juan Luis Tamargo, MD, FESC, and Samuel Wann, MD, FACC, FESC

### **ACC/AHA/ESC 2006 Guidelines for the Management of Patients With Atrial Fibrillation**

- *Definition*
- *Classification*
- *Epidemiology and prognosis*
- *Pathophysiological mechanisms*
- *Causes, associated conditions, clinical manifestations, and quality of life*
- *Clinical evaluation*
- *Preventing thromboembolism*

- Jason D. Roberts, MD, and Michael H. Gollob, MD

### Impact of Genetic Discoveries on the Classification of Lone Atrial Fibrillation

*Atrial fibrillation (AF), the most common sustained cardiac arrhythmia, represents a major burden to patients and health care systems through its sequelae of heart failure and stroke. Recent genetic studies, triggered in part by evidence of a hereditary component of AF, have begun to identify predisposing genes and offer further insights into the mechanisms of lone AF.*

- David R. Holmes, Jr, MD; Dean J. Kereiakes, MD; Neal S. Kleiman, MD; David J. Moliterno, MD; Giuseppe Patti, MD, and Cindy L. Grines, MD

### Combining Antiplatelet and Anticoagulant Therapies

*Antiplatelet therapy is the cornerstone for both primary and secondary prevention therapies for ischemic events resulting from coronary atherosclerotic disease. Dual antiplatelet therapy (aspirin plus a thienopyridine, usually clopidogrel) has assumed a central role in the treatment of acute coronary syndromes and after coronary stent deployment. In addition to antiplatelet therapy, anticoagulant therapy might be indicated for stroke prevention in a variety of conditions that include atrial fibrillation, profound left ventricular dysfunction, and after mechanical prosthetic heart valve replacement.*

- Francisco Marín, MD, PhD; Rocío González-Conejero, PhD; Piera Capranzano, MD; Theodore A. Bass, MD; Vanessa Roldán, MD, PhD, and Dominick J. Angiolillo, MD, PhD

### Pharmacogenetics in Cardiovascular Antithrombotic Therapy

*Thrombosis is the most important underlying mechanism of coronary artery disease and embolic stroke. Hence, antithrombotic therapy is widely used in these scenarios. Pharmacogenetics has emerged as a field that identifies specific gene variants able to explain the variability in patient response to a given drug. The present paper reviews the modulating role of different polymorphisms on individuals' responses to antithrombotic drugs commonly used in clinical practice.*

- Carl J. Lavie, MD; Richard V. Milani, MD, and Hector O. Ventura, MD

### **Obesity and Cardiovascular Disease. Risk Factor, Paradox, and Impact of Weight Loss**

*Obesity has reached global epidemic proportions in both adults and children and is associated with numerous comorbidities, including hypertension (HTN), type II diabetes mellitus, dyslipidemia, obstructive sleep apnea and sleep-disordered breathing, certain cancers, and major cardiovascular (CV) diseases. This review summarizes the adverse effects of obesity on CV disease risk factors and its role in the pathogenesis of various CV diseases, reviews the obesity paradox and potential explanations for these puzzling data, and concludes with a discussion regarding the current state of weight reduction in the prevention and treatment of CV diseases.*

- Tsuneaki Sadanaga, MD, PhD; Motoaki Sadanaga, MD, PhD, and Satoshi Ogawa, MD, PhD

### **Evidence That D-Dimer Levels Predict Subsequent Thromboembolic and Cardiovascular Events in Patients With Atrial Fibrillation During Oral Anticoagulant Therapy**

*Atrial fibrillation is associated with hemostatic abnormalities even during oral anticoagulant therapy. D-dimer levels reflect a pro-thrombogenic state and thus might serve as a marker of thromboembolic and cardiovascular events. The aim of the present study was to evaluate whether elevated D-dimer levels can predict subsequent thromboembolic and cardiovascular events in patients with atrial fibrillation during oral anticoagulant therapy.*

- Mikhael F. El-Chami, MD; Patrick Kilgo, MS; Vinod Thourani, MD; Omar M. Lattouf, MD; David B. Delurgio, MD; Robert A. Guyton, MD; Angel R. Leon, MD, and John D. Puskas, MD

### **New-Onset Atrial Fibrillation Predicts Long-Term Mortality After Coronary Artery Bypass Graft**

*Post-operative atrial fibrillation (POAF) predicts longer hospital stay and greater post-operative mortality. We sought to investigate the association between new-onset atrial fibrillation after coronary artery bypass graft (CABG) and long-term mortality in patients with no history of atrial fibrillation.*

- Martin K. Stiles, MB, ChB, PhD; Bobby John, MD, PhD; Christopher X. Wong; Pawel Kuklik, PhD; Anthony G. Brooks, PhD; Dennis H. Lau, MBBS; Hany Dimitri, MBBS; Kurt C. Roberts-Thomson, MBBS, PhD; Lauren Wilson, BSc; Paolo De Sciscio, BSc; Glenn D. Young, MBBS, and Prashanthan Sanders, MBBS, PhD

### **Paroxysmal Lone Atrial Fibrillation Is Associated With an Abnormal Atrial Substrate. Characterizing the "Second Factor"**

*While "atrial fibrillation begets atrial fibrillation," prompt termination to prevent electrical remodeling does not prevent disease progression. The purpose of this study was to determine whether patients with paroxysmal "lone" atrial fibrillation have an abnormal atrial substrate.*

- Carl J. Lavie, MD; Richard V. Milani, MD; Mandeep R. Mehra, MD, and Hector O. Ventura, MD

### **Omega-3 Polyunsaturated Fatty Acids and Cardiovascular Diseases**

*Omega-3 polyunsaturated fatty acid ( $\omega$ -3 PUFA) therapy continues to show great promise in primary and, particularly in secondary prevention of cardiovascular (CV) diseases. We discuss the evidence from retrospective epidemiologic studies and from large randomized controlled trials showing the benefits of  $\omega$ -3 PUFA, specifically EPA and DHA, in primary and secondary CV prevention and provide insight into potential mechanisms of these observed benefits.*

### **INFLUENTIAL PAPERS**

*Selected abstracts from highly relevant publications*

### **LANDMARK CLINICAL TRIALS**

*Trial results that have highly influenced scientific knowledge and practice*

**The long- and short-term impact of elevated body mass index on the risk of new atrial fibrillation: the WHS (Women's Health Study)**

**Atrial fibrillation and heart failure in cardiology practice: reciprocal impact and combined management from the perspective of atrial fibrillation: results of the Euro Heart Survey on Atrial Fibrillation**



# ■ Contents

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## *Rate vs Rhythm Control*

# 2

- Valentin Fuster, MD, PhD, FACC, FAHA, FESC, Co-Chair;  
Lars E. Rydén, MD, PhD, FACC, FESC, FAHA, Co-Chair; David S. Cannom, MD, FACC;  
Harry J. Crijns, MD, FACC, FESC; Anne B. Curtis, MD, FACC, FAHA;  
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Juan Luis Tamargo, MD, FESC, and Samuel Wann, MD, FACC, FESC

### **ACC/AHA/ESC 2006 Guidelines for the Management of Patients With Atrial Fibrillation**

- *Management*
- *Strategic objectives*
- *Heart rate control versus rhythm control*
- *Cardioversion of atrial fibrillation*
- *Pharmacological agents to maintain sinus rhythm*
- *Direct-current cardioversion of atrial fibrillation*
- *Maintenance of sinus rhythm*
- *Proposed management strategies*

- Mario Talajic, MD; Paul Khairy, MD, PhD; Sylvie Levesque, MSc; Stuart J. Connolly, MD;  
Paul Dorian, MD; Marc Dubuc, MD; Peter G. Guerra, MD; Stefan H. Hohnloser, MD;  
Kerry L. Lee, PhD; Laurent Macle, MD; Stanley Nattel, MD; Ole D. Pedersen, MD;  
Lynne Warner Stevenson, MD; Bernard Thibault, MD; Albert L. Waldo, MD;  
D. George Wyse, MD, PhD, and Denis Roy, MD

### **Maintenance of Sinus Rhythm and Survival in Patients With Heart Failure and Atrial Fibrillation**

*The value of sinus rhythm maintenance in patients with atrial fibrillation (AF) and heart failure (HF) is uncertain. The goal of this study was to evaluate the relationship between the presence of sinus rhythm and outcomes in patients with a history of congestive heart failure (CHF) and AF.*

- Matthew W. Martinez, MD; Jacobo Kirsch, MD; Eric E. Williamson, MD; Imran S. Syed, MD; DaLi Feng, MD; Steve Ommen, MD; Douglas L. Packer, MD, and Peter A. Brady, MD, FRCP

### Utility of Nongated Multidetector Computed Tomography for Detection of Left Atrial Thrombus in Patients Undergoing Catheter Ablation of Atrial Fibrillation

*Multidetector computed tomography (MDCT) is commonly used to render pulmonary vein and left atrial anatomy before catheter ablation of atrial fibrillation (CAAF). Transesophageal echocardiography (TEE) is also often performed before the ablation to exclude LAA thrombus. Whether MDCT alone is sufficient to exclude left atrial appendage (LAA) thrombus is unknown. The aim of this study was to determine whether MDCT is able to exclude LAA thrombus in patients referred for CAAF.*

- Thomas Münzel, MD, and Tommaso Gori, MD, PhD

### Nebivolol: The Somewhat-Different $\beta$ -Adrenergic Receptor Blocker

*Although its clinical use in Europe dates almost 10 years, nebivolol is a  $\beta$ -blocker that has been only recently introduced in the U.S. market. Like carvedilol, nebivolol belongs to the third generation of  $\beta$ -blockers, which possess direct vasodilator properties in addition to their adrenergic blocking characteristics. Nebivolol has the highest  $\beta_1$ -receptor affinity among  $\beta$ -blockers and, most interestingly, it substantially improves endothelial dysfunction via its strong stimulatory effects on the activity of the endothelial nitric oxide synthase and via its antioxidative properties.*

## INFLUENTIAL PAPERS

*Selected abstracts from highly relevant publications*

## LANDMARK CLINICAL TRIALS

*Trial results that have highly influenced scientific knowledge and practice*

Comparative efficacy of dronedarone and amiodarone for the maintenance of sinus rhythm in patients with atrial fibrillation

Prevention of recurrent lone atrial fibrillation by the angiotensin-ii converting enzyme inhibitor ramipril in normotensive patients

Warfarin genotyping reduces hospitalization rates: results from the MM-WES (Medco-Mayo Warfarin Effectiveness Study)

Dabigatran versus warfarin in patients with atrial fibrillation

Beta-blockade with nebivolol in elderly heart failure patients with impaired and preserved left ventricular ejection fraction: data from SENIORS (Study of Effects of Nebivolol Intervention on Outcomes and Rehospitalization in Seniors With Heart Failure)

Lenient versus strict rate control in patients with atrial fibrillation

Effect of clopidogrel added to aspirin in patients with atrial fibrillation

Effect of dronedarone on cardiovascular events in atrial fibrillation

Valsartan for prevention of recurrent atrial fibrillation



# ■ Contents

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## *Prevention and Therapy*

# 3

- Valentin Fuster, MD, PhD, FACC, FAHA, FESC, Co-Chair;  
Lars E. Rydén, MD, PhD, FACC, FESC, FAHA, Co-Chair; David S. Cannom, MD, FACC;  
Harry J. Crijns, MD, FACC, FESC; Anne B. Curtis, MD, FACC, FAHA;  
Kenneth A. Ellenbogen, MD, FACC; Jonathan L. Halperin, MD, FACC, FAHA;  
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S. Bertil Olsson, MD, PhD, FESC; Eric N. Prystowsky, MD, FACC;  
Juan Luis Tamargo, MD, FESC, and Samuel Wann, MD, FACC, FESC

### **ACC/AHA/ESC 2006 Guidelines for the Management of Patients With Atrial Fibrillation**

#### *- Nonpharmacological Therapy for Atrial Fibrillation*

- Anita Wokhlu, MD; Kristi H. Monahan, RN; David O. Hodge, MS; Samuel J. Asirvatham, MD;  
Paul A. Friedman, MD; Thomas M. Munger, MD; David J. Bradley, MD, PhD;  
Christine M. Bluhm, RN; Janis M. Haroldson, RN, and Douglas L. Packer, MD

### **Long-Term Quality of Life After Ablation of Atrial Fibrillation. The Impact of Recurrence, Symptom Relief, and Placebo Effect**

*Although the primary goal of atrial fibrillation (AF) ablation is quality of life (QoL) improvement, this effect has yet to be demonstrated in the long term. We sought to determine the relationship between AF ablation efficacy, QoL, and AF-specific symptoms at 2 years.*

- C. Jan Willem Borleffs, MD; Johannes B. van Rees, MD; Guido H. van Welsenes, MS; Enno T. van der Velde, PhD; Lieselot van Erven, MD, PhD; Jeroen J. Bax, MD, PhD, and Martin J. Schalij, MD, PhD

### **Prognostic Importance of Atrial Fibrillation in Implantable Cardioverter-Defibrillator Patients**

*The prevalence of atrial fibrillation (AF) has taken epidemic proportions in the population with cardiovascular disease. The prognostic importance of different types of AF in implantable cardioverter-defibrillator (ICD) patients remains unclear. This study aimed to assess the prevalence of different types of AF and their prognostic importance in ICD patients.*

- David R. Holmes, Jr, MD; Rick Nishimura, MD; Rebecca Fountain, RN, and Zoltan G. Turi, MD

### **Iatrogenic Pericardial Effusion and Tamponade in the Percutaneous Intracardiac Intervention Era**

*The number, specific type, and complexity of percutaneous intracardiac procedures continue to evolve. Many of these procedures require left atrial access using transseptal techniques. These approaches carry with them the potential for pericardial effusion (PE) and cardiac tamponade, particularly in the setting when intraprocedural anticoagulation is being administered. PEs and even cardiac tamponade have been documented with both diagnostic as well as therapeutic procedures. When the effusion is a complication of an intracardiac procedure, it is usually the result of a cardiac perforation. Prompt recognition is essential so that prevention of the transition from effusion to tamponade can be attempted (e.g., by reversing anticoagulation) or the hemodynamic collapse can either be averted or treated.*

## INFLUENTIAL PAPERS

*Selected abstracts from highly relevant publications*

## LANDMARK CLINICAL TRIALS

*Trial results that have highly influenced scientific knowledge and practice*

Percutaneous left atrial appendage occlusion for patients in atrial fibrillation suboptimal for warfarin therapy: 5-year results of the PLAATO (Percutaneous Left Atrial Appendage Transcatheter Occlusion) study

Comparison of antiarrhythmic drug therapy and radiofrequency catheter ablation in patients with paroxysmal atrial fibrillation: a randomized controlled trial

Catheter ablation versus antiarrhythmic drugs for atrial fibrillation: the A4 study

Antiarrhythmics after ablation of atrial fibrillation (5A study)

Percutaneous closure of the left atrial appendage versus warfarin therapy for prevention of stroke in patients with atrial fibrillation: a randomised non-inferiority trial



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