

Goldberger's Clinical Electrocardiography A Simplified Approach

EIGHTH EDITION

Ary L. Goldberger, MD, FACC

Professor of Medicine, Harvard Medical School
Director, Margret and H.A. Rey Institute for Nonlinear Dynamics
in Physiology and Medicine
Beth Israel Deaconess Medical Center
Boston, Massachusetts

Zachary D. Goldberger, MD, MS, FACP

Assistant Professor of Medicine
Division of Cardiology
Harborview Medical Center
University of Washington School of Medicine
Seattle, Washington

Alexei Shvilkin, MD, PhD

Assistant Clinical Professor of Medicine, Harvard Medical School
Director, Arrhythmia Monitoring Laboratory
Beth Israel Deaconess Medical Center
Boston, Massachusetts

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1600 John F. Kennedy Blvd.
Ste 1800
Philadelphia, PA 19103-2899

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A SIMPLIFIED APPROACH**

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Preface

This book is an introduction to electrocardiography. We have written it particularly for medical students, house officers, and nurses. It assumes no previous instruction in electrocardiogram reading. The book has been widely used in introductory courses on the subject. "Frontline" clinicians, including hospitalists, emergency medicine physicians, instructors, and cardiology trainees wishing to review basic ECG knowledge, also have found previous editions useful.

Our "target" reader is the clinician who has to look at ECGs without immediate specialist backup and make critical decisions—sometimes at 3 AM!

This new, more compact, eighth edition is divided into three sections. Part One covers the basic principles of electrocardiography, normal ECG patterns, and the major abnormal depolarization (P-QRS) and repolarization (ST-T-U) patterns. Part Two describes the major abnormalities of fast and slow heart rhythms. Part Three briefly presents an overview and review of the material. Additional material—both new and review—will also be made available in a new online supplement.

We include some topics that may at first glance appear beyond the needs of an introductory ECG text (e.g., digitalis toxicity, distinguishing atrial flutter vs. atrial fibrillation). However, we include them because of their clinical relevance and their importance in developing ECG "literacy."

In a more general way, the rigor demanded by competency in ECG analysis serves as a model of clinical thinking, which requires attention to the subtlest of details and the highest level of integrative of reasoning (i.e., the *tertium quid* and the *foret*). Stated another way, ECG analysis is one of the unique areas in medicine in which you literally watch physiology and pathophysiology "play out" at the millisecond-seconds time-scales and make bedside decisions based on this real-time data. The P-QRS-T sequence is an actual mapping of the electrical signal spreading through the

heart, providing a compelling connection between basic "preclinical" anatomy and physiology and the recognition and treatment of potentially life-threatening problems.

The *clinical applications* of ECG reading are stressed throughout the book. Each time an abnormal pattern is mentioned, the conditions that might have produced it are discussed. Although the book is not intended to be a manual of therapeutics, general principles of treatment and clinical management are briefly discussed. Separate chapters are devoted to important special topics, including electrolyte and drug effects, cardiac arrest, the limitations and uses of the ECG, and electrical devices, including pacemakers and implantable cardioverter-defibrillators.

In addition, students are encouraged to approach ECGs in terms of a rational simple differential diagnosis based on pathophysiology, rather than through the tedium of rote memorization. It is reassuring to discover that the number of possible arrhythmias that can produce a heart rate of more than 200 beats per minute is limited to just a handful of choices. Only three basic ECG patterns are found during most cardiac arrests. Similarly, only a limited number of conditions cause low-voltage patterns, abnormally wide QRS complexes, ST segment elevations, and so forth.

In approaching any ECG, "three and a half" essential questions must always be addressed: What does the ECG show and what else could it be? What are the possible causes of this pattern? What, if anything, should be done about it?

Most basic and intermediate level ECG books focus on the first question ("What is it?"), emphasizing pattern recognition. However, waveform analysis is only a first step, for example, in the clinical diagnosis of atrial fibrillation. The following questions must also be considered: What is the differential diagnosis? ("What else could it be?"). Are you sure the ECG actually shows atrial fibrillation

and not another “look-alike pattern,” such as multifocal atrial tachycardia, sinus rhythm with atrial premature beats, or even an artifact resulting from parkinsonian tremor. What could have caused the arrhythmia? Treatment (“What to do?”), of course, depends in part on the answers to these questions.

The continuing aim of this book is to present the contemporary ECG as it is used in hospital wards, outpatient clinics, emergency departments, and intensive/cardiac (coronary) care units, where recognition of normal and abnormal patterns is only the starting point in patient care.

The eighth edition contains updated discussions on multiple topics, including arrhythmias and conduction disturbances, sudden cardiac arrest, myocardial ischemia and infarction, drug toxicity, electronic pacemakers, and implantable cardioverter-defibrillators. Differential diagnoses are highlighted, as are pearls and pitfalls in ECG interpretation.

This latest edition is written in honor and memory of two remarkable individuals: Emanuel Goldberger, MD, a pioneer in the development of

electrocardiography and the inventor of the aVF, aVL, and aVR leads, who was co-author of the first five editions of this textbook, and Blanche Goldberger, an extraordinary artist and woman of valor.

I am delighted to welcome two co-authors to this edition: Zachary D. Goldberger, MD, and Alexei Shvilkin, MD, PhD.

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Ary L. Goldberger, MD

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