

The Practice of Electrocardiography

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A Problem-Solving Guide to Confident Interpretation

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Preface

Electrocardiography is a mature discipline, so familiar to both doctors and patients that it's hardly noticed, one of those tests that have always been there, like the white count and hemoglobin, not something one has to think about much, or question. To some extent this view is valid, but it overlooks some important points. Like the white count and hemoglobin, electrocardiograms are produced by technicians using mechanical devices that turn out numbers, but there is a difference. The white count and hemoglobin are reported as single values to be interpreted by the doctor who knows the patient and ordered the test, but the graph produced by an EKG machine represents millions of numbers displayed as *XY* plots, a message written in a language different from one's own. It requires translation, and this means that the translator must not only know the language, but also be able to assess the effects on it of the many factors that may have modified its meaning between origin and delivery. There is potential for harm to the patient, as well as for help, in every facet of the process, and to lose sight of this, to see the tracing as a single whole, would be like seeing words as units without considering the letters that compose them. When we read, we do recognize whole words, patterns, but, having learned the letters first, revert to this base intuitively when we encounter a new word, or one that is misspelled.

Electrocardiography is probably the only medical specialty in which no consensus has evolved on just what data must be obtained, how they should be obtained, or, once in hand, how they should be rearranged into a useful statement of what they mean. The motivation for *The Practice of Electrocardiography* is to propose a solution for this enigma by describing the methods needed for analysis and synthesis, and standards for the product, a complete and adequate report. This approach is planned especially for medical students who want to build a firm base of understanding, for house officers, more advanced but still mystified by some of the literature and by

discussions on rounds and at conferences, and for nurses, especially those in monitoring units, who may occasionally be confused by the nomenclature they must deal with. Cardiologists who interpret tracings for others and would like to review why they think what they think, and to write more convincing reports, will find some useful insights. EKG technicians, and those who teach them or are responsible for their work, should also find the book helpful, especially Chapter Six on technical methods.

What one gets from *The Practice of Electrocardiography* will depend on what is brought to it, and how the knowledge will be applied. The objective is understanding, not speed. Speed and confidence come with experience and cannot be acquired without time and effort.

Observation has taught that medical students like to get right to the point, to do something rather than talk about it, and this has dictated the organization of the subject matter. After the point of departure, and the end sought, have been established, the reader is asked follow the instructions in Chapter Two to interpret a tracing. This how-to chapter is, I believe, unique in the literature and, like instruction in physical diagnosis, concerned mostly with methods. It also contains references to other sections of the book where anatomic and physiologic principles, analytic methods as such, and pragmatic application are each considered, and where references to the underlying literature can be found.

For one interested in some depth, the discipline of electrocardiography is put in historic perspective, and several subjects not covered in most other texts are considered. The not-very-technical section on technical methods is included to call attention to that area as a major source of clinical problems, and to emphasize the importance of the technician. Doctors don't have to be skilled at recording tracings, but do need to know what happens inside each instrument in the system, and how it affects the result. And doctors should have recorded at least a few EKGs, in order to be able to recognize technical problems and tell the technician how to correct them.

The index has been planned to make it easy to locate information on almost any subject or problem likely to be encountered—by any name.

The views expressed have been developed with the help of many, many teachers, medical students, house officers, practicing physicians, technicians, and patients during twenty-five years of a practice limited to electrocardiography while teaching students and technicians. Dr. James R. Dawson was especially influential early in the development of my thought processes, Dr. John A. Gronvall contributed much time and advice in development of the original version of the text, and data accumulated during summer research projects by Drs. Michael W. Coleman, David B. McDaniel, and Andrew J. Myrick Jr. when they were medical students are included in the essay on the determinants of voltage. It is a pleasure to acknowledge the support of Drs. Harper K. Hellems, Patrick H. Lehan, Angel Markow, David H. Mulholland, John B. O'Connell, Kurt D. Olinde, Gaston Rodriguez, and Thomas N. Skelton, and the counsel of Dr. Julius M. Cruse and other faculty associates. The support and advice of Mr. Thomas Lanigan of Humana Press, and the patience of the staff of the Departments of Medical Illustration, Photography, and Computer Graphics at the University of Mississippi have been invaluable.

Thos. M. Blake, MD

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