Practical Clinical Chemistry

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Preface

Practical Clinical Chemistry is an outgrowth of our previous contributions of sections on clinical chemistry to several editions of a book on clinical laboratory methods. While working in the clinical laboratory, during professional consultations, and in the process of research and teaching medical technology students, we frequently felt the need of a book that would treat the subject of clinical chemistry in greater detail and emphasize at the same time some of the more recent developments in clinical laboratory techniques, such as automation and radioimmunoassay methods. As none of the clinical laboratory texts currently available seemed to fit these needs, the present book was developed.

The first chapters are concerned with instrumentation, quality control, and normal values. The textual discussion of procedures for determining normal values is, we believe, more complete than that found in most other treatments of this subject. The chapters dealing with routine chemical determinations are quite complete, with alternative methods given for all the more important determinations.

To keep the book to a reasonable size, discussion of the historical background of various laboratory determinations is minimal. Formerly popular methods are mentioned but not discussed in detail. Similarly, information on the abnormal values for the constituents of body fluids is not given in great detail. The more common causes for elevated or depressed levels of body fluid constituents are discussed, but unusual or uncommon causes for variations from the established clinical norms have been omitted. Our attention is focused primarily on the chemical methods themselves.

The chapter on enzymes is much more extensive than that found in most books in the field. Detailed determination procedures are given for practically all the enzymes usually reported by clinical laboratories in the United States. Some details of laboratory determinations also are described for a considerable number of other enzymes. The Enzyme Commission names and numbers are included with the revised recommendations of The Commission on Enzymes of the International Union of Biochemistry.

Methods for the chemical determination of a number of hormones in blood and urine are included. The discussion of gas-liquid chromatographic methods has been purposely limited. Proper discussion of this field would require a chapter in itself. This discussion was not presented because radioimmunoassay methods mentioned in this text will probably in time supersede other methods such as gas-liquid chromatography.

In view of the increasing importance of the new radioimmunoassay (RIA) methods for the determination of blood serum levels of many hormones and drugs,

the theory of a methodology for such determinations is treated in some detail in a separate chapter. Details of the evaluation techniques for a number of important hormones and drugs are given. Since most of these methods are best performed with kits or at least with labeled antigens from commercial suppliers, a list of current sources of supply is given in this chapter.

The chapter on automation is an extensive review of the types of automated and partially automated equipment available in this country at the time of writing (1974). General information is given as to the type of operation, number of different tests available, speed of operation, and other pertinent facts. Since the type of instrument best suited for a given laboratory depends so much on the particular clinical requirements of that laboratory, only general information can be given, but it should be sufficient to enable concerned professionals to decide which particular instruments should be investigated further for possible use in a particular laboratory.

We feel that this book will be of value to virtually all clinical chemistry laboratories. The smaller ones will find methods for the more common analyses, which are satisfactory on a small scale, and the larger laboratories will find good methods for the less commonly performed tests. We endeavor to make the book as complete as possible without being unduly lengthy. With rapid advances in the field, it is difficult to keep up with new developments. We include as many newer methods as appear to give satisfactory results with a saving in time or reagents compared to older methods, although not all of them have been extensively evaluated in our laboratories.

We are very appreciative of the great assistance and advice given by our director, William H. Masters, M.D., and by Fred Belliveau, David Rollow, and other members of the editorial staff of Little, Brown; we are also grateful to the illustrator Donna Werber from the Washington University Medical School, Department of Illustration, St. Louis, Missouri, and to Joan Bauman of the Reproductive Biology Research Foundation, St. Louis, Missouri, for her contribution to the RIA chapter. We are grateful for the advice, assistance, and moral support given by our wives Elena Toro and Momoyo Ackermann, without whose assistance we would not have reason to be grateful to anyone.

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