
The author states on his web site: “I have decided to publish this edition as an e-book so that I do not have to revise the book in its entirety before updating it. Instead, I plan to revise the book chapter by chapter over time and to make each revised chapter available as soon as its revision is complete”. The first edition was published by Urban & Schwarzenberg in 1985.

The author also states his purpose for writing this book: “The effective use of laboratory study results depends upon a working knowledge of probabilistic decision-making and on a thorough understanding of how the entities measured in the laboratory relate to the physiologic processes of interest to the clinician. This book presents a comprehensive discussion on these topics, thereby providing a logical framework for the use of laboratory studies in medical practice”.

This book is highly mathematical in its presentation, and my reading revealed that the mathematical and systematic aspects of clinical laboratory testing are the author’s true interests. In these areas, his presentations are well-written, comprehensive, and clear. The early chapters of his book (Chapters 1–6) and the final chapter (Chapter 12), which tap into these areas of strength, make for the best reading. I cannot, however, give Chapters 7–11 high grades.

I like the concept of an e-book that is freely available online and the author’s intent to update chapters one by one and to post them on the Web as they are updated. However, free resources often come with their drawbacks. This textbook is no exception. Most of the book’s references are rather dated; for several chapters, the most recent reference is ~1990. If the author’s process of updating chapters one at a time takes a long time, the timely coverage of topics in this volume will be spotty.

Chapter 1 discusses how laboratory testing fits into the overall goals of medical care and clinical information needs. The chapter includes a description of the SI unit system for reporting laboratory results, methods for unit conversion, and calculated results. Sources of variability in laboratory results are presented along with approaches for determining laboratory reference intervals. Although the presentation of this material is clear, most of the references for this chapter predate 1990, and examples used in the chapter (e.g., use of creatine kinase MB in the diagnosis of myocardial infarction) are correspondingly out of date.

Chapter 2 considers test measurement systems and approaches to assess accuracy, precision, and specificity; to set analytical quality goals; and to maintain quality by use of quality-control rules. Among the concepts presented are method evaluation, method write-ups, univariate and multivariate approaches for method optimization, evaluation of linearity, linear regression analysis, difference plots, recovery studies, cross-reactivity, interference studies, analytical range, method comparison studies, and boot-strapping (jack-knifing) for calculation of confidence intervals. The material presented is accurate, but the highly mathematical orientation may put it beyond the grasp of many non-mathematically oriented clinical laboratorians.

Chapter 3 examines the use of tests in diagnosis and prognosis. Sensitivity, specificity, and ROC curves are presented as tools for the evaluation of diagnostic performance. All ROC curves are plotted with specificity as the x axis rather than the more conventionally used (1-specificity). Efficiency and predictive values of positive and negative results are also presented as test evaluation measures. Linear and quadratic discriminant analyses are presented as potential classification tools, but the author does not indicate how ROC curves can be constructed for discriminant functions. The Bayes formula as used in estimating the posttest (posterior) probability of disease given the pretest (a priori) probability of disease is presented, but surprisingly, it is not related to the predictive value of diagnostic tests. Univariate likelihood ratios are presented, as well as multivariate likelihood ratios derived by use of logistic regression functions. These concepts are presented clearly and comprehensively.

Chapter 4 reports approaches for the evaluation of classification studies. Although the information contained in this chapter is correct and well presented, the core of it is based on studies published in the 1980s and early 1990s. The wealth of information emanating from the evidence-based medicine community that has been published since that time on the evaluation of the diagnostic and prognostic accuracies of laboratory tests is not reviewed in this chapter. Although the information on the use of laboratory tests in monitoring (Chapter 5) is presented well, this chapter is also out of date.

Chapter 6 presents the subject of biological variability. Criteria for developing sex- and/or age-based reference intervals are considered. Included in this section is a graphic approach to help decide whether to divide reference intervals based on discrete characteristics such as age or race. Unfortunately, this approach is not described sufficiently to allow the reader to apply it. Specific examples of analytes with sex-, age-, race-, or pregnancy-affected reference intervals are discussed. Biorhythms are covered cursorily.

Chapter 12 examines the topic of pharmacokinetics. The chapter covers traditional compartmental analysis, distribution, clearance, dosing, heterogeneity in kinetic parameters, design of initial dosing and maintenance dosing regimens, monitoring therapy, and adjusting dosing regimens. Advanced topics include the use of Bayesian forecasting techniques for establishing values of kinetic parameters in individual patients with limited blood samples, noncompartmental pharmacokinetic analysis, and nonlinear plasma drug kinetics.

Chapter 7, on organ function, covers homeostasis, synthetic rate, clearance rate, organ synthetic and clearance rates, and absorption. Endocrine
systems with feedback inhibition are considered as well as protein binding, binding kinetics, and the laboratory measurement of bioactive fractions of protein-bound constituents.

Chapters 8–11 focus on laboratory evaluation of nutritional status, tissue injury, genetic disease, and cancer, respectively. Chapter 8 fails to provide a comprehensive presentation on the assessment of nutritional status. Chapter 9 covers a broad array of topics: markers of cellular damage, immunologic injury (including immune complex deposition, autoimmune disease, organ-localized disease, and systemic disease), tissue transplantation, transfusion, and infection (including microscopy and culture, specimen collection, microbial substances, immune response, and antimicrobial susceptibility testing). None of these topics is presented in much depth (the total length of the chapter is 20 pages). Chapter 10 presents genetic disease in the space of 16 pages. The topics covered include chromosome analysis; chromosome banding; molecular diagnostic studies, including PCR, allele-specific oligonucleotide hybridization, Southern blot hybridization, and Northern blot hybridization; genetic disorders of metabolism; genetic disorders of plasma proteins; genetic disorders of blood cells; screening for genetic disease; newborn screening; screening for adult-onset genetic disease; carrier detection; and prenatal screening. All these topics are covered on a very general and superficial level. Chapter 11, on cancer, is very spotty in its coverage. Prostate-specific antigen and prostate cancer are considered in depth, whereas other cancers and tumor markers are covered cursorily or not at all. None of these chapters will impart a comprehensive knowledge of the subject matter covered.

This volume cannot be considered a general reference for laboratory medicine. The author’s web page promotes the book as “A free e-book for residents in Laboratory Medicine and senior medical students”. Laboratory, residents, and medical students interested in the mathematical and systematic aspects of laboratory medicine may find the material presented in Chapters 1–6 and Chapter 12 worthwhile reading.

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Correction


They fulfilled the criteria for HUS [hemolytic anemia with microangiopathic changes, typical deformation of erythrocytes in the peripheral blood smear (Burr cells), acute renal failure, and thrombocytopenia] and presented with pneumonia or meningitis.

The authors apologize for any confusion this may have caused.