

The goal of this second edition of *Medical Physiology* is to provide a clear, accurate, and up-to-date introduction to medical physiology for medical students and students in the allied health sciences. Physiology, the study of normal function, is key to understanding pathophysiology and pharmacology and is essential to the everyday practice of clinical medicine.

**Level.** The level of the book is meant to be midway between an oversimplified review book and an encyclopedic textbook of physiology. Each chapter is written by medical school faculty members who have had many years of experience teaching physiology and who are experts in their field. They have selected material that is important for medical students to know and have presented this material in a concise, uncomplicated, and understandable fashion. We have purposely avoided discussion of research laboratory methods or historical material because most medical students are too busy to be burdened by such information. We have also avoided topics that are unsettled, recognizing that new research constantly provides fresh insights and sometimes challenges old ideas.

**Key Changes.** Many changes have been instituted in this second edition. All chapters were rewritten, in some cases by new contributors, and most illustrations have been redrawn. The new illustrations are clearer and make better use of color. An effort has also been made to institute more conceptual illustrations, rather than including more graphs and tables of data. These conceptual diagrams help students understand the general underpinnings of physiology. Another key change is the book's size: It is more compact because of deletions of extraneous material and shortening of some of the sections, most notably the gastrointestinal physiology section. We also overhauled many of the features in the book. Each chapter now contains a list of key concepts. The clinical focus boxes have been updated; they are more practical and less research-oriented. Each chapter includes a case study, with questions and answers. All of the review questions at the end of each chapter are now of the USMLE type. Lists of common abbreviations in physiology and of normal blood values have been added.

**Content.** This book begins with a discussion of basic physiological concepts, such as homeostasis and cell signaling, in Chapter 1. Chapter 2 covers the cell membrane, membrane transport, and the cell membrane potential. Most of the remaining chapters discuss the different organ systems: nervous, muscle, cardiovascular, respiratory, renal, gastrointestinal, endocrine, and reproductive physi-

ology. Special chapters on the blood and the liver are included. Chapters on acid-base regulation, temperature regulation, and exercise discuss these complex, integrated functions. The order of presentation of topics follows that of most United States medical school courses in physiology. After the first two chapters, the other chapters can be read in any order, and some chapters may be skipped if the subjects are taught in other courses (e.g., neurobiology or biochemistry).

Material on pathophysiology is included throughout the book. This not only reinforces fundamental physiological principles but also demonstrates the relevance of physiology to an understanding of numerous medically important conditions.

**Pedagogy.** This second edition incorporates many features that should aid the student in his or her study of physiology:

- **Chapter outline.** The outline at the beginning of each chapter gives a preview of the chapter and is a useful study aid.
- **Key concepts.** Each chapter starts with a short list of key concepts that the student should understand after reading the chapter.
- **Text.** The text is easy to read, and topics are developed logically. Difficult concepts are explained clearly, often with the help of figures. Minutiae or esoteric topics are avoided.
- **Topic headings.** Second-level topic headings are active full-sentence statements. For example, instead of heading a section "Homeostasis," the heading is "Homeostasis is the maintenance of steady states in the body by coordinated physiological mechanisms." In this way, the key idea in a section is immediately obvious.
- **Boldfacing.** Key terms are boldfaced upon their first appearance in a chapter.
- **Illustrations and tables.** The figures have been selected to illustrate important concepts. The illustrations often show interrelationships between different variables or components of a system. Many of the figures are flow diagrams, so that students can appreciate the sequence of events that follow when a factor changes. Tables often provide useful summaries of material explained in more detail in the text.
- **Clinical focus boxes.** Each chapter contains one or two clinical focus boxes that illustrate the relevance of the physiology discussed in the chapter to an understanding of medicine.
- **Case studies.** Each section concludes with a set of case studies, one for each chapter, with questions and answers. These case studies help to reinforce how an un-

derstanding of physiology is important in dealing with clinical conditions.

- **Review questions and answers.** Students can use the review questions at the end of each chapter to test whether they have mastered the material. These USMLE-type questions should help students prepare for the Step 1 examination. Answers to the questions are provided at the end of the book and include explanations as to why the choices are correct or incorrect.
- **Suggested readings.** Each chapter provides a short list of recent review articles, monographs, book chapters, classic papers, or Web sites where students can obtain additional information.
- **Abbreviations and normal values.** This second edition includes a table of common abbreviations in physiology and a table of normal blood, plasma, or serum values. All abbreviations are defined when first used in the text, but the table of abbreviations in the appendix serves as a useful reminder of abbreviations commonly used in physiology and medicine. Normal values for blood are also embedded in the text, but the table on the inside of the

front cover provides a more complete and easily accessible reference.

- **Index.** A complete index allows the student to easily look up material in the text.

**Design.** The design of this second edition has been completely overhauled. The new design makes navigating the text easier. Likewise, the design highlights the pedagogical features, making them easier to find and use.

We thank the contributors for their patience and for following directions so that we could achieve a textbook of reasonably uniform style. Dr. James McGill was kind enough to write the clinical focus boxes and case studies for Chapters 26 and 27. We thank Marlene Brown for her secretarial assistance, Betsy Dileria for her critical editing of each chapter, and Kathleen Scogna, our development editor, without whose encouragement and support this revised edition would not have been possible.

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