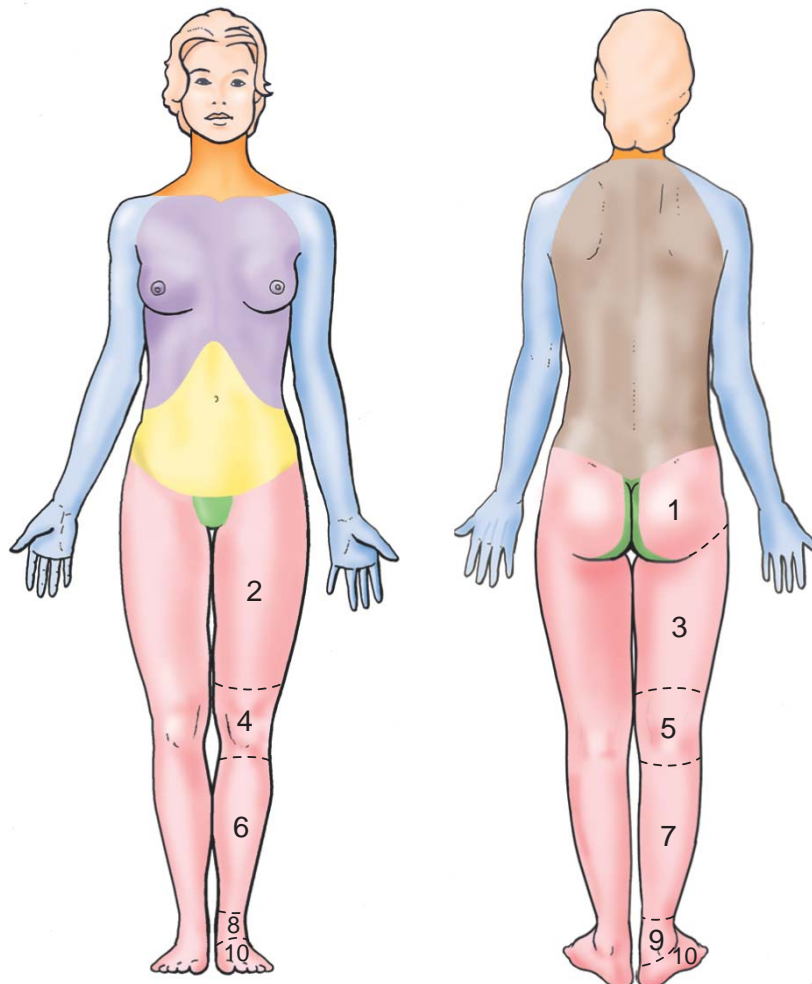


CLINICALLY ORIENTED Anatomy

SIXTH EDITION

Key Major Parts of the Body

| | | | |
|--|--|---|--|
|  Head |  Thorax |  Abdomen |  Lower limb |
|  Neck |  Back |  Pelvis/perineum |  Upper limb |



Introduction

1 Thorax

2 Abdomen

3 Pelvis and Perineum

4 Back

5 Lower Limb

6 Upper Limb

7 Head

8 Neck

9 Cranial Nerves

CLINICALLY ORIENTED Anatomy

SIXTH EDITION

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In loving memory of Marion,

My best friend, wife, colleague, mother of our five children and grandmother of our nine grandchildren for her love, unconditional support, and understanding. • (KLM)

To Muriel

My bride, best friend, counselor, and mother of our sons; and to our family—Tristan, Lana, Elijah and Finley; Denver, and Skyler—with love and great appreciation for their support, understanding, good humor, and—most of all—patience. • (AFD)

To my husband, Enno, and my children, Erik and Kristina, for their support and encouragement. • (AMRA)

To Our Students

You will remember some of what you hear, much of what you read, more of what you see, and almost all of what you experience and understand fully.



**Keith L. Moore, Ph.D.,
F.I.A.C., F.R.S.M., F.A.A.A.**

Dr. Moore has been the recipient of many prestigious awards and recognition. He has received the highest awards for excellence in human anatomy education at the medical, dental, graduate, and undergraduate levels—and for his remarkable record of textbook publications in clinically oriented anatomy and embryology—from both the American Association of Anatomists (AAA: **Distinguished Educator Award**, 2007) and the American Association of Clinical Anatomists (AACA:

Honored Member Award, 1994). In 2008 Dr. Moore was inducted as a Fellow of the American Association of Anatomists. The rank of Fellow honors distinguished members who have demonstrated excellence in science and their overall contributions to the medical sciences. Recently Dr. Moore was awarded **Honorary Membership** in the Società Italiana di Anatomia e Istologia (SIAI) as acknowledgment of his outstanding merits as a scientist, educator, and writer.

Arthur F. Dalley II



Preface

Nearly a third of a century has passed since the first edition of *Clinically Oriented Anatomy* appeared on bookstore shelves. Although the factual basis of anatomy is remarkable among basic sciences for its longevity and consistency, this book has evolved markedly since its inception. This is a reflection of changes in the clinical application of anatomy, new imaging technologies that reveal living anatomy in new ways, and improvements in graphic and publication technology that enable superior demonstration of this information. Efforts continue to make this book even more student friendly and authoritative. The sixth edition has been thoroughly reviewed by students, anatomists, and clinicians for accuracy and relevance and revised with significant new changes and updates.

KEY FEATURES

Clinically Oriented Anatomy has been widely acclaimed for the relevance of its clinical correlations. As in previous editions, the sixth edition places clinical emphasis on anatomy that is important in physical diagnosis for primary care, interpretation of diagnostic imaging, and understanding the anatomical basis of emergency medicine and general surgery. Special attention has been directed toward assisting students in learning the anatomy they will need to know in the twenty-first century, and to this end new features have been added and existing features updated.

Clinical correlations. Popularly known as “blue boxes,” the clinical information sections have grown, and many of them are now supported by photographs and/or dynamic color illustrations to help with understanding the practical value of anatomy. In response to our readers’ suggestions, the blue boxes have been grouped together within chapters, enabling presentation of topics with less interruption of the running text.

Bottom line summaries. A new feature in the fifth edition, frequent “bottom line” boxes summarize the preceding information, ensuring that primary concepts do not become lost in the many details necessary for thorough understanding. These summaries provide a convenient means of ongoing review and underscore the big picture point of view.

Anatomy described in a practical, functional context. A more realistic approach to the musculoskeletal system emphasizes the action and use of muscles and muscle groups in daily activities, emphasizing gait and grip. The eccentric

contraction of muscles, which accounts for much of their activity, is now discussed along with the concentric contraction that is typically the sole focus in anatomy texts. This perspective is important to most health professionals, including the growing number of physical and occupational therapy students using this book.

Surface anatomy and medical imaging. Surface anatomy and medical imaging, formerly presented separately, are now integrated into the chapter, presented at the time each region is being discussed, clearly demonstrating anatomy’s relationship to physical examination and diagnosis. Both natural views of unobstructed surface anatomy and illustrations superimposing anatomical structures on surface anatomy photographs are components of each regional chapter. Medical images, focusing on normal anatomy, include plain and contrast radiographic, MRI, CT, and ultrasonography studies, often with correlative line art as well as explanatory text, to help prepare future professionals who need to be familiar with diagnostic images.

Case studies, accompanied by clinico-anatomical problems and USMLE-style multiple-choice questions. Interactive case studies and multiple-choice questions are available to our readers online at <http://thePoint.lww.com>, providing a convenient and comprehensive means of self-testing and review.

Extensive art program. The extensive art program initiated in the fourth edition has been extended and revised. An effort has been made to ensure that all the anatomy presented and covered in the text is also illustrated. The text and illustrations have been developed to work together for optimum pedagogical effect, aiding the learning process and markedly reducing the amount of searching required to find structures. The great majority of the clinical conditions are now supported by photographs and/or color illustrations; multipart illustrations often combine dissections, line art, and medical images; most tables appear in color and are illustrated to aid the student’s understanding of the structures described.

Terminology. The terminology fully adheres to *Terminologia Anatomica* (1998), approved by the International Federation of Associations of Anatomists (IFAA). Although the official English-equivalent terms are used throughout the book, when new terms are introduced, the Latin form, used in Europe, Asia, and other parts of the world, is also provided. The roots and derivations of terms are provided to help students understand meaning and increase retention. Eponyms, although not endorsed by the IFAA, appear in parentheses in this edition—for example, sternal angle

(angle of Louis)—to assist students who will hear eponymous terms during their clinical studies.

RETAINED AND IMPROVED FEATURES

Students and faculty have told us what they want and expect from *Clinically Oriented Anatomy*, and we listened:

- A *comprehensive text* enabling students to fill in the blanks, as time allotted for lectures continues to decrease, laboratory guides become exclusively instructional, and multiauthored lecture notes develop inconsistencies in comprehension, fact, and format.
- A *resource capable of supporting areas of special interest and emphasis* within specific anatomy courses that *serves the anatomy needs of students during both the basic science and the clinical phases of their studies*.
- A *thorough Introduction* that covers important systemic information and concepts basic to the understanding of the anatomy presented in the subsequent regional chapters. Students from many countries and backgrounds have written to express their views of this book—gratifyingly, most are congratulatory. Health professional students have more diverse backgrounds and experiences than ever before. Curricular constraints often result in unjustified assumptions concerning the prerequisite information necessary for many students to understand the presented material. The Introduction includes efficient summaries of functional systemic anatomy. Students' comments specifically emphasized the need for a systemic description of the nervous system and the peripheral autonomic nervous system (ANS) in particular.
- Routine facts (such as muscle attachments, innervations, and actions) presented in *tables organized to demonstrate shared qualities and illustrated to demonstrate the provided information*. *Clinically Oriented Anatomy* provides more tables than any other anatomy textbook.
- *Illustrated clinical correlations* that not only describe but also *show anatomy as it is applied clinically*.
- *Illustrations that facilitate orientation*. Many orientation figures have been added, along with arrows to indicate the locations of the inset figures (areas shown in close-up views) and viewing sequences. Almost all illustrations have been completely relabeled, moving the viewpoint out of the legend and next to each part of every illustration. Labels have been placed to minimize the distance between label and object, with leader lines running the most direct course possible.

ADDITIONAL FEATURES FOR THE SIXTH EDITION

- Many new full-color illustrations, including many multi-part illustrations combining dissections, line art, and

medical images such as CTs and MRIs have been added to this edition.

- Blue boxes are classified to indicate the type of clinical information covered:



Anatomical variations icon. These blue boxes feature anatomical variations that may be encountered in the dissection lab or in practice, emphasizing the clinical importance of awareness of such variations.



Life cycle icon. These blue boxes emphasize prenatal developmental factors that affect postnatal anatomy and anatomical phenomena specifically associated with stages of life—childhood, adolescence, adult, and advanced age.



Trauma icon. The effect of traumatic events—such as fractures of bones or dislocations of joints—on normal anatomy and the clinical manifestations and dysfunction resulting from such injuries are featured in these blue boxes.



Diagnostic procedures icon. Anatomical features and observations that play a role in physical diagnosis are targeted in these blue boxes.



Surgical procedures icon. These blue boxes address such topics as the anatomical basis of surgical procedures, such as the planning of incisions, and the anatomical basis of regional anesthesia.



Pathology icon. The effect of disease on normal anatomy, such as cancer of the breast, and anatomical structures or principles involved in the confinement or dissemination of disease within the body are the types of topics covered in these blue boxes.

- **Boldface type** indicates the main entries of anatomical terms, when they are introduced and defined. In the index, the page numbers of these main entries also appear in boldface type, so that the main entries can be easily located. Boldface type is also used to introduce clinical terms in the clinical correlation (blue) boxes. *Italic type* indicates anatomical terms important to the topic and region of study or labeled in an illustration that is being referenced.
- Useful content outlines appear at the beginning of every chapter.
- Instructor's resources and supplemental materials, including images exportable for *Power Point* presentation, are available through <http://thePoint.lww.com>.

We welcome Anne M. R. Agur, Ph.D., to the team of authors for the sixth edition. From the outset, *Clinically Oriented Anatomy* has utilized materials from *Grant's Atlas*, for which Anne has had responsibility since 1991. Anne made significant contributions to previous editions of *Clinically Oriented*

Anatomy beyond the sharing of materials from *Grant's Atlas*, and has been involved in—and been an asset to—every stage of the development of this new edition.

COMMITMENT TO EDUCATING STUDENTS

This book is written for health science students, keeping in mind those who may not have had a previous acquaintance with anatomy. We have tried to present the material in an interesting way so that it can be easily integrated with what will be taught in more detail in other disciplines such as physical diagnosis, medical rehabilitation, and surgery. We hope

this text will serve two purposes: to educate and to excite. If students develop enthusiasm for clinical anatomy, the goals of this book will have been fulfilled.

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Anne M. R. Agur
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ABBREVIATIONS

| | |
|---------|-----------------------------------|
| a., aa. | artery, arteries |
| ant. | anterior |
| B.C.E. | before the Common (Christian) era |
| C | cervical |
| C.E. | Common (Christian) era |
| Co | coccygeal |
| dim. | diminutive |
| e.g. | for example |
| et al. | and others |
| F | female |
| Fr. | French |
| G. | Greek |
| i.e. | that is |
| inf. | inferior |

| | |
|---------|-------------------------------|
| L | liter, lumbar |
| L. | Latin |
| lev. | levator |
| lit. | literally |
| M | male |
| m., mm. | muscle, muscles |
| Mediev. | medieval |
| Mod. | modern |
| post. | posterior |
| S | sacral |
| sup. | superior, superioris |
| supf. | superficial |
| T | thoracic |
| TA | <i>Terminologia Anatomica</i> |
| v., vv. | vein, veins |
| vs. | versus |

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- Keith L. Moore
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Anne M. R. Agur

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Fig. 3.43A Grant's Atlas of Anatomy. 12th ed. Fig. 3-22A, p. 232.

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Fig. 3.48 Grant's Atlas of Anatomy. 12th ed. Figs. 3-40A, 3-17B, 3-30B, and 3-40B, p. 228 and p. 244.

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Fig. 3.64 Grant's Atlas of Anatomy. 11th ed.

Fig. 3.65 *Modified from* Grant's Atlas of Anatomy. 11th ed.

Fig. 3.67A & C Grant's Atlas of Anatomy. 12th ed. Fig. 3.47A & B, p. 253.

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Fig. 3.70A Grant's Atlas of Anatomy. 11th ed.

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Fig. 3.72A Grant's Atlas of Anatomy. 12th ed. Fig. 3-69, p. 279.

Fig. 3.72B *Courtesy of* Dr. M. A. Haider, University of Toronto, Canada.

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Fig. 3.73A Grant's Atlas of Anatomy. 12th ed. Fig. 3-69A, p. 279.

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Fig. 5.5B Grant's Atlas of Anatomy. 9th ed.
Fig. 5.11 Grant's Atlas of Anatomy. 11th ed.
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Fig. 5.36A Grant's Atlas of Anatomy. 11th ed.
Fig. 5.38A Basic Clinical Massage Therapy: Integrating Anatomy and Treatment.
Fig. 5.40A Basic Clinical Massage Therapy: Integrating Anatomy and Treatment.
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Fig. 5.53A–C Grant's Atlas of Anatomy. 11th ed.
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Fig. 5.55A & B(insert) Grant's Atlas of Anatomy. 11th ed.
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Fig. 5.68A, C, & H Basic Clinical Massage Therapy
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Fig. 6.37 Grant's Atlas of Anatomy. 11th ed.; Grant's Atlas of Anatomy. 12th ed. Fig. 6.20B, p. 502
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Fig. 6.39C *Courtesy of* D. Armstrong, University of Toronto, Canada.
Fig. 6.40 Grant's Atlas of Anatomy. 12th ed. Fig. 6.18, p. 500.
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Fig. 6.57 *Modified from* Anderson JE: Grant's Atlas of Anatomy. 7th ed. Baltimore: Williams & Wilkins, 1978.
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Fig. 6.60B & C Basic Clinical Massage Therapy, 2nd ed. Fig. 5.5, p. 186.
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Fig. 6.74B Grant's Atlas of Anatomy. 12th ed. Fig. 6.06C, p. 568.
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Fig. 6.97B & D Grant's Atlas of Anatomy. 11th ed.
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Fig. 7.2C *Courtesy of* Arthur F. Dalley Ph.D.
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