

UPDATES AND ADDITIONS

FROM THE AUTHORS

In biological evolution, a successful species becomes the best suited that it can be for a particular environment. In a similar manner, *Hole's Human Anatomy & Physiology* continues to evolve as a modern exploration of the human, from the cellular and molecular underpinnings of the functions of life to its interacting organ systems.

We are authors, but first and foremost we are teachers. What we and our reviewers do in class is reflected in each new edition. We are especially excited about the Learn, Practice, Assess approach to this new edition. Each chapter opens with Learning Outcomes, contains numerous opportunities to Practice throughout, and closes with Assessments that are closely tied to the learning outcomes.

Students have always come first in our approach to teaching and textbook authoring, but we now feel more excited than ever about the student-oriented, teacher-friendly quality of this text. We have never included detail for its own sake, but we have felt free to include extra detail if the end result is to clarify.

The level of this text is geared toward students in two-semester courses in anatomy and physiology who are pursuing careers in nursing and allied health fields and who have minimal background in physical and biological sciences. The first four chapters review chemistry and physiological processes. Students who have studied this material previously will view it as a welcomed review, but newcomers will not find it intimidating.

Remember that although you are working hard to successfully complete this course, you are not doing so for us, or even for your teacher. You are working for yourselves and for your future patients, as health care professionals. Your course is not so much a hurdle as a stepping stone, even more so a foundation. We have written this book to help prepare you for success along that path.

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GLOBAL CHANGES

- Numbered A heads easily link to Learning Outcomes/Assessments
- Introductory sections for each chapter
- Practice questions dividing sections numbered sequentially for clearer/easier reference
- Added pronunciations
- New and updated boxes throughout illuminate new technologies, including biomarkers, reprogrammed (induced pluripotent) stem cells, DNA microarrays, nanotechnology, the metabolome and microbiome, microRNAs, brain banks, RNA interference, tissue engineering, vaccines, stem cell therapies, and direct-to-consumer genetic testing.

Chapter 1

- New figure on directional terms
- Update terminology to be consistent with Terminologia Anatomica
- Improved shading on figures depicting body cavities

- Gene expression profiling to flesh out anatomy and physiology ties in to final chapter

Chapter 3

- Vignette introduces new HIV drug
- Updated coverage of the mechanism of osmosis
- From Science to Technology box on tailoring stem cells to treat disease

Chapter 4

- Figure 4.20 on DNA replication includes the cell cycle, with reference to the changes in chromosome structure that occur during S phase
- From Science to Technology 4.1 discusses an Innocence Project case

Chapter 5

- New micrograph for chapter opener (better view of whole tissue)
- Moved intercellular junctions from chapter 3 to chapter 5 introduction
- Many new micrographs and accompanying line art
- New icon for fig. 5.12 (a) salivary glands instead of pancreas

Chapter 6

- New vignette highlights cryo-electron tomography view of proteins responsible for the skin's integrity
- Added to melanin production (from tyrosine in melanosomes)
- Moved skin color to melanin production earlier in chapter
- New micrographs and corresponding line art, and other new photos
- Clarified wound healing in the text and figure

Chapter 7

- Added scientific names to layers in epiphyseal plate
- Some labels added to figures to correlate to muscle attachments referenced in chapter 9
- Table of male/female skeletal differences reworked/expanded in side by side comparison

Chapter 8

- New vignette on glucosamine and chondroitin to treat arthritis
- New illustrations for joint movements using real people

Chapter 9

- New vignette on the muscular movements behind “texting”
- Piriformis and quadratus lumborum added to muscle coverage

Chapter 11

- New figure on brain and brain regions
- Updated discussion of Broca’s area and Wernicke’s area
- New figures add detail to brachial and lumbosacral nerve plexuses
- New Clinical Application on traumatic brain injury

Chapter 13

- Clinical Application updates performance enhancement
- Two boxes update progress in treating diabetes

Chapter 14

- New chapter opener photo
- Clinical Application case of a young editor with leukemia and the “miracle drug” Gleevec
- New Clinical Application on deep vein thrombosis
- New micrographs include the 5 types of white blood cells
- Moved up figure summarizing blood composition
- Improved figures 14.21 and 14.22
- Update of terminology (hematopoietic stem cell)

- New tables on ABO blood type frequencies and inherited blood disorders

Chapter 15

- Added coronal section of cadaver heart
- Figure 15.21 altered to emphasize depolarization/repolarization rather than valves
- Figure 15.24 added schematic of general reflex arc to correlate with the baroreceptor reflex control of heart rate
- Figures 15.53, 15.57, and 15.58 redrawn to depict paired veins in the upper and lower limbs

Chapter 16

- New micrographs
- Updated anti-rejection treatment protocols
- Added concept of herd immunity
- Figure 16.17a expanded to include cytotoxic and memory T cells
- Moved lymphocyte functions to T and B cell discussions for better flow

Chapter 17

- New vignette on gut microbiome
- Figure 17.4 rearranged into one column for better flow
- New micrographs and new corresponding line art
- Figure 17.17b revised labels
- Figure 17.19a new line art shows three layers of muscle
- Figure 17.19b new micrograph
- Figure 17.44 new radiograph of colon

Chapter 18

- Figure 18.1 expanded to include the effects of ghrelin on appetite, with the text reflecting the complexity of appetite control
- New photos for obesity/athlete/scurvy/anorexia
- Replaced Atkins diet food pyramid with Mediterranean diet pyramid
- Clinical Application 18.1 on obesity includes lap-band surgery and updated information on gastric bypass surgery
- Includes discussion of BMI

Chapter 19

- New vignette on secondhand smoke
- Updated coverage of respiratory control

Chapter 20

- New vignette on a medical mystery (Balkan nephropathy)
- New figures on nephron anatomy, including representation of the macula densa as part of the ascending limb of the nephron loop
- New table of developmental abnormalities of the urinary system

Chapter 22

- New chapter opener photo
- Moved meiosis to introduction, before details of spermatogenesis/oogenesis
- New micrographs
- Figure 22.8 more clearly explains number of chromatids per chromosome
- All new photos of birth control, including female condom and spermicides
- Updated STDs/sexually transmitted infections (STIs)

Chapter 23

- The conjoined twins in Clinical Application 23.2 are now teens!
- Clinical Application 23.4 on living to age 100.
- Human embryonic stem cells de-emphasized to reflect other types of stem cells in use

Chapter 24

- Complete update and overhaul to reflect change in focus in field
- New vignette on direct-to-consumer (web-based) genetic testing
- New Clinical Application 24.1 introduces modes of inheritance through genetic counseling cases
- Final section on gene expression explaining anatomy and physiology brings the book full circle back to chapter 1