

# **Anatomy & Physiology: An Integrative Approach, 3e**

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ISBN: 1259398625

## **Detailed List of New Features**

Real student data points derived from thousands of SmartBook users have guided the revision process for this edition. In addition, this revision has been informed by dozens of chapter reviews by A&P instructors.

The following global changes have been implemented throughout all chapters:

- Additional references were added to concepts previously covered, as well as to related material in upcoming sections and chapters, to further connect concepts.
- Terminology has been updated and definitions are added throughout.
- New "What Do You Think?" and "What Did You Learn?" questions were added throughout the text.

## **Chapter by Chapter Changes**

### **Chapter 1**

- New section added about how best to study A&P
- Revised: figure 1.8, figure 1.9, figure 1.13
- Clinical View 1.1: Etiology (Causes) and Pathogenesis (Development) of Disease updated to include more detail on sonography and imaging; added new photos and labeling to images

### **Chapter 2**

- Moved description of inorganic and organic molecules from section 2.7: Biological Molecules to beginning of section 2.4: Molecular Structure of Water and the Properties of Water
- Revised: figure 2.1b, figure 2.9, figure 2.10, figure 2.13, figure 2.17, figure 2.19, figure 2.20, figure 2.21, figure 2.22, figure 2.24, figures within table 2.4

### **Chapter 3**

- Revised: figure 3.1, figure 3.3, figure 3.6, figure 3.7, figure 3.10, figure 3.13, figure 3.14, figure 3.16, figure 3.18, figure 3.19

- Revised coverage of ATP cycling in section 3.2b: Classification of Chemical Reactions

#### **Chapter 4**

- Revised: figure 4.4, figure 4.5, figure 4.6, figure 4.7, figure 4.9, figure 4.10, figure 4.11, figure 4.14, figure 4.15, figure 4.17, figure 4.18, figure 4.19, figure 4.20, figure 4.21, figure 4.23, figure 4.27, figure 4.28, figure 4.30, figure 4.32, figure 4.39, figure 4.42 (several new photos)
- New figure 4.38 on genetic code
- Modified section 4.1a: How Cells Are Studied
- Updated section 4.2b: Membrane Proteins
- Revised section 4.3: Membrane Transport
- Revised and reorganized section 4.6b: Non-Membrane-Bound Organelles

#### **Chapter 5**

- Updated art in tables 5.2, 5.3
- Revised: figure 5.4, figure 5.8, figure 5.10, figure 5.11, figure 5.12
- Modified section 5.2b: Functions of Connective Tissue
- Updated text in tables 5.6, 5.10
- Removed coverage of perichondrium (covered in Chapter 7)
- Modified section 5.5b: Body Membranes
- Updated Clinical View 5.4: Stem Cells
- Revised Clinical View 5.5: Gangrene
- Updated Chapter Summary to include lymph in discussion of fluid connective tissue

#### **Chapter 6**

- Updated terminology to use “keratinocyte” instead of “cell” where appropriate
- Updated section on stratum corneum to include coverage of dermidicin
- Removed reference to human pheromones

#### **Chapter 7**

- In section 7.2, added information on the appearance of living bone
- Revised: figure 7.4, figure 7.11, figure 7.15
- Revised discussion of exercise in space
- Clinical View 7.7: Osteoporosis—added information on DEXA scans

#### **Chapter 8**

- Table 8.1 revised to include parietal foramina
- Revised: figure 8.5, figure 8.7a, figure 8.11, figure 8.12a, figure 8.14, figure 8.22a, figure 8.31, figure 8.34b
- In section 8.2b: Views of the Skull and Landmark Features, revised sella turcica information to include hypophyseal fossa
- Table 8.2 and table 8.3 figures were revised to improve clarity and accuracy
- Revised Clinical View 8.2: Craniosynostosis and Plagiocephaly
- In section 8.3: Bones Associated with the Skull, revised information on functions of the hyoid bone’s cornua and body
- Revised figure in Clinical View 8.4: Herniated Discs
- Table 8.6 text and figures updated regarding width of pelvis and ilia

#### **Chapter 9**

- Reversed order of sections 9.5 and 9.6, so Movements of Synovial Joints are discussed prior to Synovial Joints and Levers

- Table 9.1 simplified
- Revised: figure 9.2, figure 9.3, figure 9.6, figure 9.14
- Modified description of synovial membrane

## Chapter 10

- Updated section 10.1a: Functions of Skeletal Muscle and section 10.1b: Characteristics of Skeletal Muscle Cells
- Revised section 10.2a: Gross Anatomy of Skeletal Muscle
- Revised section 10.2b: Microscopic Anatomy of Skeletal Muscle to add details of triad
- Revised section 10.4: Skeletal Muscle Metabolism
- Revised section 10.8: Effects of Exercise and Aging on Skeletal Muscle
- New Concept Connection on Excitability
- New Learning Strategy on prefixes myo-, mys-, sarco-
- New Concept Connection on connective tissue coverings
- New Clinical View 10.1: Muscular Dystrophy
- New Concept Connection on nervous system diseases that influence muscle function
- New Clinical View 10.9: Unbalanced Skeletal Muscle Development
- New Concept Connection on Myogenic Response
- Revised: figure 10.1, figure 10.3, figure 10.6, figure 10.7, figure 10.9, figure 10.10, figure 10.11, figure 10.12, figure
- New Learning Strategy on states of voltage-gated Na<sup>+</sup> channels
- Updated Clinical View 13.3: Meningitis and Encephalitis 10.14, figure 10.15, figure 10.16, figure 10.17, figure 10.20, figure 10.21, figure 10.22, figure 10.30
- New Learning Strategy on functions of the hypothalamus
- Revised figure in Learning Strategy on sarcomere shortening
- Revised coverage of medulla autonomic centers
- New: figure 10.17 on ATP for muscle metabolism; figure 10.21 on recruitment; figure 10.24 comparing isometric and isotonic contractions; figure 10.26 on maximizing force of contractions

## Chapter 11

- Replaced “origin” and “insertion” with “superior” and “inferior attachment” where appropriate
- Revised Clinical View 11.2: Idiopathic Facial Nerve Paralysis (Bell Palsy) to include information on Lyme disease effects
- New photo in Clinical View 11.2: Idiopathic Facial Nerve Paralysis (Bell Palsy)
- Revised: table 11.3, table 11.8, table 11.18
- Revised: figure 11.17, figure 11.19, figure 11.21b, figure 11.22
- New photo in Clinical View 11.7: Lateral Epicondylitis (“Tennis Elbow”)
- Revised figure in Clinical View 11.8: Carpal Tunnel Syndrome

## Chapter 12

- Revised section 12.2b: Neuron Structure
- Added section 12.1c: Nerves and Ganglia
- New Concept Connection on bundling by connective tissue
- New Concept Connection on excitability
- New Learning Strategy on glial cells
- Clinical View 12.3: Nervous System Disorders Affecting Myelin now includes Zika virus as it relates to Guillain-Barré syndrome
- Revised Clinical View 12.6: Altered Acetylcholine Function and Changes in Breathing
- Section 12.1c: Nerves and Ganglia was previously section 12.2e (moved forward in the chapter)
- Revised: figure 12.3, figure 12.5, figure 12.6, figure 12.7, figure 12.9b, figure 12.10, figure 12.11, figure 12.14,

- figure 12.16, figure 12.17, figure 12.18, figure 12.21, figure 12.22, figure 12.23, figure 12.24, figure 12.25
- New Clinical View 12.1: Pathogenic Agents and Fast Axonal Transport figure of axonal transport for how pathogenic organisms move to cell body
- New illustration of battery for text discussion on Ohm's Law (pg. 457)
- New figure 12.13: Neuron's and Ohm's Law
- New photo in figure 12.17

### **Chapter 13**

- Revised section 13.1: Brain Organization and Development
- Revised Clinical View 13.1: Traumatic Brain Injuries: Concussion and Contusion
- Revised section 13.1c: Gray Matter and White Matter Distribution
- Revised: figure 13.1, figure 13.4, figure 13.5, figure 13.9, figure 13.12, figure 13.14, figure 13.21, figure 13.23b, figure 13.24a, figure 13.25, figure 13.30, figure 13.31
- Revised table 13.2, table 13.4, table 13.5
- Revised Clinical View 13.6: Mapping Functional Brain Regions

### **Chapter 14**

- Revised section 14.1: Overview of the Spinal Cord and Spinal Nerves reorganized to provide an overview of the chapter content; section 14.1c: Spinal Nerve Identification and Gross Anatomy now contains content on spinal roots that was moved from section 14.5a
- Section 14.2: Protection and Support of the Spinal Column revised to include more explanation on vertebral column
- Section 14.3: Sectional Anatomy of the Spinal Cord and Spinal Roots provides more information on functional relationship between gray matter and spinal nerve roots, sensory receptors, and effectors.
- Section 14.5a: General Distribution of Spinal Nerves
- Revised: figure 14.1, figure 14.2, figure 14.4, figure 14.5, figure 14.6, figure 14.10, figure 14.14, figure 14.18c

### **Chapter 15**

- Section 15.3b: Pelvic Splanchnic Nerves rearranged to discuss parasympathetic cranial nerve physiology first, followed by anatomy
- Section 15.5: Autonomic Plexuses and the Enteric Nervous System moved forward to appear after discussion of sympathetic and parasympathetic systems
- New section 15.5b: Enteric Nervous System
- New Learning Strategy on parasympathetic division
- Updated Clinical View 15.3: Raynaud Syndrome, with photo added
- Revised: figure 15.4, figure 15.6, figure 15.7b, figure 15.10, figure 15.11

### **Chapter 16**

- New Clinical View 16.2: Eye Infections
- Revised: figure 16.2, figure 16.3, figure 16.5, figure 16.7, figure 16.8, figure 16.10, figure 16.15, figure 16.18, figure 16.22, figure 16.26, figure 16.27, figure 16.28
- Added Concept Connection to describe a sinus
- Added Concept Connection on resting membrane potential
- Added Concept Connection on nodal cells compared to neurons
- Added Concept Connection on conductivity

### **Chapter 17**

- Section 17.1a: Overview of Endocrine System rewritten and expanded
- Revised: Section 17.1b: Comparison of the Two Control Systems

- Section 17.1c: General Functions of the Endocrine System contains added examples for each function of the endocrine system
- Section 17.3b: Local Hormones rewritten, now includes new Concept Connection on local hormones that act as vasoactive substances; new Clinical View 17.1: Synthesis of Eicosanoids
- Section 17.7b: Interactions Between the Hypothalamus and the Posterior Pituitary Gland contains expanded description of ADH and oxytocin
- Section 17.7c: Interactions Between the Hypothalamus and the Anterior Pituitary Gland reorganized and updated to add explanation for figure 17.12
- Revised: figure 17.1, figure 17.5, figure 17.7, figure 17.8, figure 17.10, figure 17.11, figure 17.12, figure 17.14, figure 17.16, figure 17.17, figure 17.18, figure 17.19, figure 17.20, figure 17.22, figure 17.23

## **Chapter 18**

- Clinical View 18.3: Transfusions updated to include information on donor wait times between transfusions
- New Clinical View 18.4: Whole Blood Versus Plasma Donations: What's the Difference?
- New Clinical View 18.5: Fetal Hemoglobin and Physiologic Jaundice
- New Learning Strategy on Blood Types
- Revised: figure 18.5a, 18.7, figure 18.8, figure 18.11 (colorized micrograph of blood clotting), figure 18.12

## **Chapter 19**

- Section 19.1a: General Function contains expanded content of the function of the cardiovascular system in transporting blood, including a new Concept Connection that provides examples of body systems dependent on blood transport
- Section 19.1b: Overview of Components revised to further describe circulation routes through the right and left sides of the heart
- New Clinical View 19.1: Congestive Heart Failure
- Section 19.2b: The Pericardium contains added description of pericardial sac
- Section 19.3a: Superficial Features of the Heart contains added explanation to align with figure 19.7
- Revised Clinical View 19.5: Coronary Heart Disease, Angina Pectoris, and Myocardial Infarction to add content on coronary heart disease
- Section 19.7b: Electrical and Mechanical Events of Cardiac Muscle Cells revised to add details on triad
- Revised: figure 19.2, figure 19.3, figure 19.7, figure 19.11, figure 19.13, figure 19.14, figure 19.16, figure 19.18, figure 19.19, figure 19.20, figure 19.21, figure 19.22

## **Chapter 20**

- Revised: figure 20.1, figure 20.3, figure 20.4, figure 20.4, figure 20.5, figure 20.7, figure 20.14, figure 20.18, figure 20.19, figure 20.20, figure 20.22, figure 20.26, figure 20.27

## **Chapter 21**

- Revised Learning Strategy on lymphocytes to describe origin of name for B-lymphocytes
- Revised: figure 21.1, figure 21.6, figure 21.9

## **Chapter 22**

- New Table 22.5: Actions of Antibodies Following Antigen Binding
- Section 22.1: Overview of Diseases Caused by Infectious Agents revised to update definition of bacteria
- New Learning Strategy on the study of the immune system
- Revised Section 22.3a: Preventing Entry
- New Learning Strategy on CD4/CD8 with MHC Class I/II
- Section 22.5b: Selection and Differentiation of T-Lymphocytes rearranged for better alignment of illustration and text

- Section 22.8b: Action of Antibodies reorganized into table format for clarity
- Revised: figure 22.1, figure 22.2, figure 22.3, figure 22.4, figure 22.7, figure 22.8, figure 22.10, figure 22.12, figure 22.13, figure 22.14, figure 22.15, figure 22.16, figure 22.17, figure 22.19, figure 22.20

### **Chapter 23**

- New Learning Strategy on structural and functional organization of the respiratory system
- Revised Section 23.3b: Trachea
- New Clinical View 23.4: Tracheotomy
- Clinical View 23.5: Bronchitis now includes coverage on exercise-induced asthma
- Revised Section 23.3c: Bronchial Tree
- Revised Section 23.3d: Respiratory Zone: Respiratory Bronchioles, Alveolar Ducts, and Alveoli
- New Clinical View 23.7: Pneumonia
- New photos of lungs in Clinical View 23.8: Smoking
- Revised: figure 23.3, figure 23.5, figure 23.6, figure 23.8, figure 23.9, figure 23.10, figure 23.11, figure 23.14, figure 23.19, figure 23.14, figure 23.16, figure 23.19, figure 23.21, figure 23.23, figure 23.25, figure 23.26, figure 23.31
- New figure 23.27: Changes in Respiratory Gas Partial Pressures Within the Blood

### **Chapter 24**

- New figure in Clinical View 24.1: Renal Ptosis and Hydronephrosis
- Section 24.3c: Juxtaglomerular Apparatus revised to expand coverage of mesangial cells
- Concept Connection on blood pressure expanded
- Revised: figure 24.2, figure 24.3, figure 24.4, figure 24.5, figure 24.6, figure 24.7, figure 24.9, figure 24.11, figure 24.13, figure 24.14, figure 24.15, figure 24.16, figure 24.18, figure 24.19, figure 24.22, figure 24.23, figure 24.24, figure 24.26, figure 24.27, figure 24.28

### **Chapter 25**

- Section 25.1: Body Fluids introduction revised to emphasize the main points of the chapter
- Figure 25.2: Percentages of Solutes in Body Fluids is new and contains the information from previous edition's Table 25.1
- New Clinical View 25.2: Hemorrhaging
- New Clinical View 25.4: Angiotensin-Converting Enzyme (ACE) Inhibitors
- Section 25.3b: Major Electrolytes: Location, Functions, and Regulation revised to integrate concepts of acid-base balance and hyperkalemia and hypokalemia
- Section 25.5: Acid-Base Balance revised for increased readability
- Section 25.5c: Respiration and Regulation of Volatile Acid has tighter integration with concepts in Chapter 23: Respiratory System

### **Chapter 26**

- Sections 26.1b, 26.1c, 26.1d, and 26.1e revised for readability
- New Learning Strategy for layers of muscularis in GI tract wall
- New Clinical View 26.3: Achalasia
- New Learning Strategy on gastric gland secretions for parietal cells and chief cells
- Sections 26.3b: Small Intestine and 26.3c: Accessory Digestive Organs and Ducts revised
- New Clinical View 26.10: Pancreatic Cancer
- New Clinical View 26.13: Fecal Transplant
- New Learning Strategy on lipid digestion and absorption
- New Clinical View 26.17: Cystic Fibrosis and the Pancreas

- New Section 26.4e: Water, Electrolyte, and Vitamin Absorption
- Revised: figure 26.2c, figure 26.6, figure 26.8, figure 26.13, figure 26.14, figure 26.15, figure 26.16, figure 26.18, figure 26.20, figure 26.22, figure 26.29

## **Chapter 27**

- New Clinical View 27.3: Obesity
- New Clinical View 27.5: Heat Related Illnesses
- Expanded Clinical View 27.6: Hypothermia, Frostbite, and Dry Gangrene

## **Chapter 28**

- Sections 28.3a: Ovaries and 28.3b: Oogenesis and the Ovarian Cycle discussion on primary and secondary follicles revised, and discussion on antral follicles expanded
- Revised information on ovarian ligaments
- Revised Clinical View 28.2: Ovarian Cancer with current statistics
- Revised Clinical View 28.5: Cervical Cancer to include information on recommendations for vaccination
- Updated Clinical View 28.6: Breast Cancer
- Revised: figure 28.4, figure 28.5, figure 28.6, figure 28.7, figure 28.9, figure 28.11, figure 28.12, figure 28.15, figure 28.16, figure 28.18, figure 28.19d

## **Chapter 29**

- Revised Clinical View 29.2: Infertility and Infertility Treatments
- Revised Clinical View 29.3: Gestational Diabetes
- Revised: figure 29.1, figure 29.3, figure 29.4, figure 29.7, figure 29.16
- New Learning Strategy on Type A and Type B Intercalated Cells
- Section 25.6: Disturbances to Acid-Base Balance is revised for increased readability and tighter integration with Clinical View 25.8: Arterial Blood Gas (ABG) and Diagnosing Different Types of Acid-Base Disturbances
- Section 25.6b: Respiratory-Induced Acid-Base Disturbances includes normal values for arterial blood gas
- New: figure 25.2, figure 25.12, figure 25.16
- Revised: figure 25.1, figure 25.4, figure 25.5, figure 25.6, figure 25.7, figure 25.8, figure 25.9, figure 25.10, figure 25.11, figure 25.12, figure 25.13, figure 25.14, figure 25.15

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