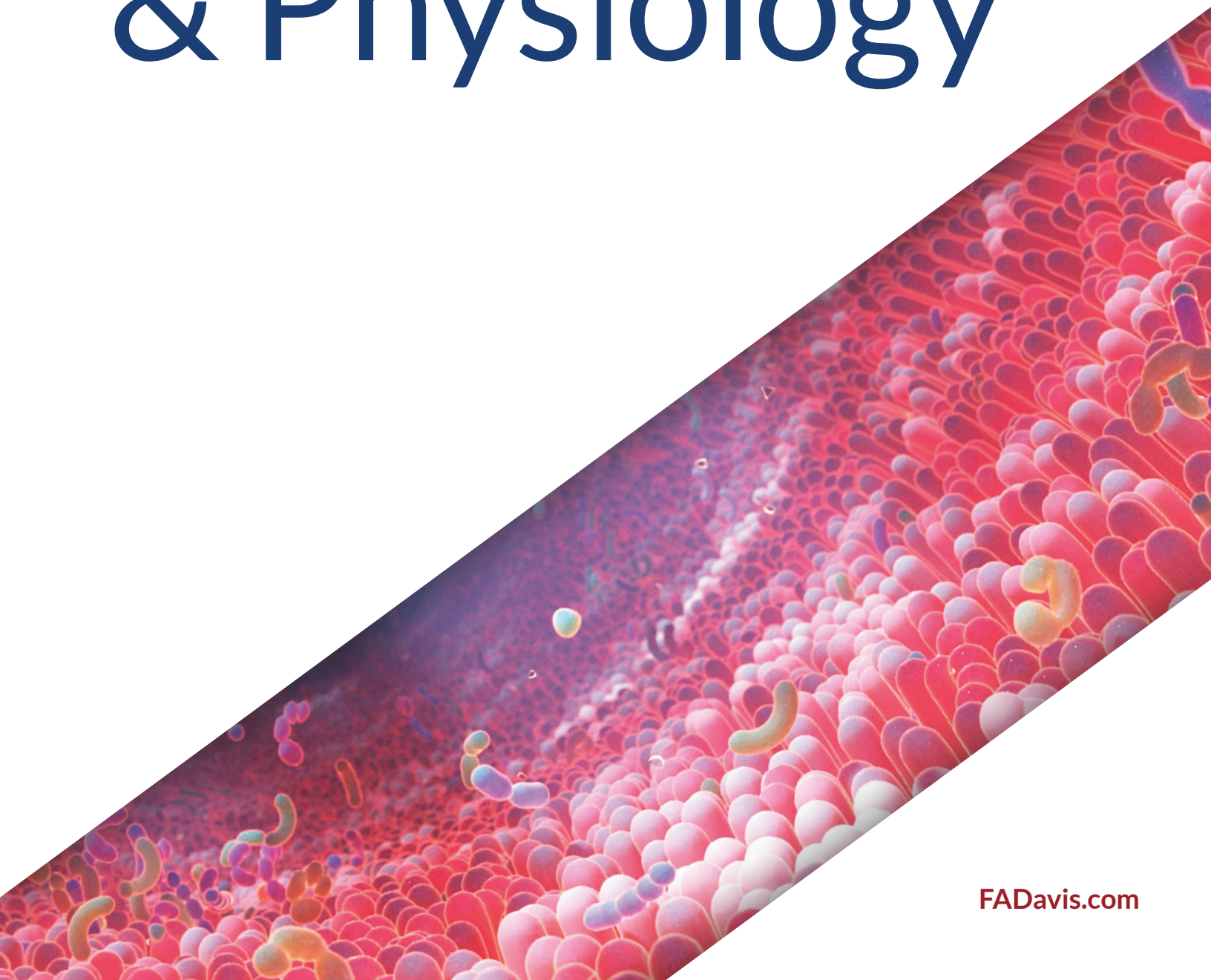


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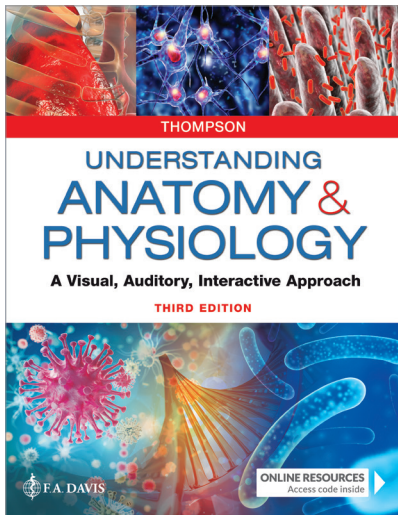


Anatomy & Physiology



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Designed for how students learn... A&P



Text

576 pages | Soft Cover | 2020

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ISBN-13: 978-0-8036-7645-9

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Understanding Anatomy & Physiology

A Visual, Auditory, Interactive Approach,
3rd Edition

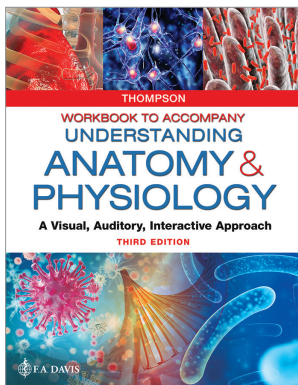
Gale Sloan Thompson, RN

Gale Sloan Thompson created a new approach to A&P designed to meet the needs of all types of learners—visual, auditory, kinesthetic, and everyone in between. She follows a traditional organization, but builds it around an innovative framework that works for every student’s unique style. The text presents units of understanding that walk your students through specific processes, encouraging non readers to learn the content and ensure success.

Perfect for all learners and levels

- Updated and expanded information about the new developments and the role of the microbiome in overall health. Students gain a more comprehensive understanding of how all of the organ systems, including the microbiome, work together and influence one another.
- New art and figures throughout enrich the illustration-centric presentation.
- “Fast Facts” in each chapter contain interesting tips related to the system.
- “The Body at Work” addresses the physiology of the system under discussion.
- “Life Lessons” apply A&P information to real-life situations.
- “Own the Information” exercises ask students to identify the most important points in each chapter and compare them to the author’s learning objectives.

Look inside! See pages 4-5 for a look inside the book.



**Ideal as a companion to the text.
Perfect as a stand-alone study guide.**

Student Workbook, 3rd Edition

Activities in the workbook reinforce key concepts from the text. Inside, your students will find hands-on methods for reviewing A&P.

- Sequencing events
- Coloring anatomical structures
- Word scramble and word matching
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- Crossword puzzles
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Student Workbook

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I finally understand A&P! *“I can’t say enough good things about this book. I was struggling to understand my assigned A&P book and I got this book as a supplement. What a difference! The content is comprehensive, as it should be, but I can understand it. The writing is clear and to the point, and colorful charts and figures take it a step further by illustrating key processes.... a real bonus for visual learners (like me). Now I’m actually excited to study A&P.”*

—Bobby T., Online Student Reviewer

for multiple learning styles.



“My students absolutely love the Thompson A&P book. It is concise and makes learning the material seem less daunting. It really hits all learning styles with the pictures, videos, text and workbook. I have seen a significant increase in student success since we implemented this book!”

—Shayna Turner, RN, MS, Isabella Graham Hart School of Practical Nursing

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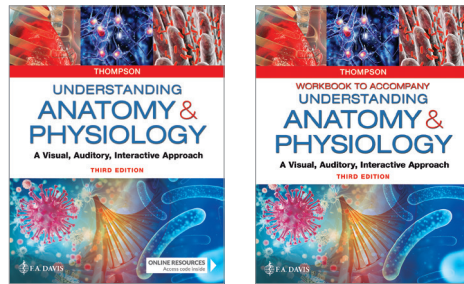
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- Webinar Recording, *The Human Microbiome*

Students

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 - Study Group podcasts with questions review difficult-to-grasp points by simulating study sessions.
 - “Chapter-in-Brief” podcasts summarize the key points in each chapter.

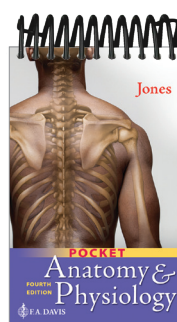


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The perfect pocket guide **Pocket Anatomy & Physiology,** 4th Edition

Shirley A. Jones, MEd, MSN, MHA, EMT-P, RN

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344 pages | 259 illustrations | Spiral binding | 2022

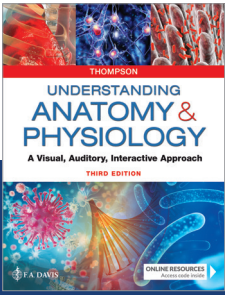
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I love this little book. *“Perfect for my anatomy & physiology class, it contains everything I need to know. It’s the perfect size and I take it with me everywhere to get some studying in. Definitely worth it for an anatomy & physiology class!”*

—Online Student Reviewer



Tackles a tough subject... with new

About the Microbiome From the Author...

Disruption of the microbiome plays a key role in development of a wide range of diseases, including heart disease, diabetes, ulcerative colitis, Parkinson's disease, and cancer. Thousands of new treatments involving manipulation of the microbiome are currently being explored, with some already in use.

For students to enjoy success in this rapidly changing healthcare landscape, it is imperative that they comprehend what the microbiome is and how it interacts with other body systems to influence health and disease.

That's why the 3rd Edition of *Understanding Anatomy & Physiology* has prioritized inclusion of the latest microbiome research, using a style that is clear, concise, and easy to understand. This information is vital to ensure that students obtain an anatomy and physiology education that is up to date, on point, and geared toward the future.

Fast Facts

Important points related to a specific body system promote active involvement in the learning process.

Chapter 4 Human Microbiome
The trillions of microorganisms living on and in the human body

FAST FACT
If gathered together, the microorganisms that inhabit the human body would occupy a space about the size of the liver and weigh approximately 3 pounds.

Furthermore, when the composition of the microbiome is disrupted, such as by an excess of a specific bacteria or, more often, through the use of broad-spectrum antibiotics, disease can result. In fact, imbalances in the microbiome are linked to numerous disorders, including diabetes, heart disease, asthma, multiple sclerosis, obesity, inflammatory bowel disease, autism, and even cancer.

This view of the body as a vast, changeable ecosystem is transforming how medicine is practiced. Instead of simply combating bacteria, practitioners are recognizing the need to cultivate and nurture the bacterial communities within our bodies.

What's more, experts look toward a future when they can map each individual's signature microbiome. Knowing someone's microbial fingerprint will allow practitioners to monitor the microbial balance, making adjustments as needed to prevent disease. If disease does occur, the same microbial fingerprint can help guide treatment. Indeed, exploration of the human microbiome has opened the door to truly personalized medicine.

FAST FACT
If gathered together, the microorganisms that inhabit the human body would occupy a space about the size of the liver and weigh approximately 3 pounds.

64 Components of the Microbiome

Bacteria make up the bulk of the human microbiome, although viruses, fungi, and archaea have also been identified. We also know that bacteria, viruses, and fungi can cause illness. Currently, scientists don't clearly understand how the body determines which microbes to kill and which microbes to nourish.

Bacteria
Bacteria—the chief inhabitants of the microbiome—are single-celled microscopic organisms. They come in a variety of shapes and sizes and are found practically everywhere on earth.

Bacteria lack a membrane-enclosed nucleus and organelles. Rather, bacterial DNA is grouped within the cell's central region.

Some bacteria have **flagella** (singular: **flagellum**), which aid in motility.

Some species of bacteria have a **capsule**: a gelatinous covering that keeps the bacterium from drying out. The capsule also helps ward off attack by larger microorganisms, including the body's white blood cells. For this reason, bacteria that have a capsule are more likely to cause disease compared with those without a capsule.

Ribosomes synthesize proteins.

Bacteria contain small loops of DNA called **plasmids** that can be transmitted from one bacterium to another, either directly or through viruses. This ability to trade genes allows bacteria to be extremely adaptable. For example, genes that resist an antibiotic can spread rapidly through a bacterial population.

A rigid **cell wall** composed of a polysaccharide molecule called **peptidoglycan** encloses the bacterium and gives the cell its shape. The composition of the cell wall varies widely between species, making it an important distinguishing factor between bacterial types. (See "Life lesson: Identifying bacteria" on page 66.)

The **cytoplasmic membrane**, composed of phospholipids and proteins, regulates the flow of materials into and out of the cell.

Many species of bacteria have small, hair-like projections called **pili**. These outgrowths allow bacteria to attach to other cells and surfaces (such as your teeth).

New Art & Figures

Enrich the illustration-centric presentation.

The Body at Work

Brief summaries explain physiological processes.

The Body AT WORK

Bacteria are microscopic, ranging in size from 1 to 10 micrometers. In contrast, viruses are ultramicroscopic; they are measured in nanometers (nm). In fact, 2000 bacteriophages would fit into a single bacterial cell.

Red blood cell

Bacterium

Adenovirus

Rhinovirus

Poliovirus

Bacteriophage

Full coverage on the Microbiome

Review of Key Terms

Every chapter features short definitions of key terms covered in the chapter. Students will find an audio glossary of these terms online.

Test Your Knowledge

Multiple-choice review questions at the end of each chapter reinforce the material and help your students to assess their progress.

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Review of Key Terms

Archaea: Extremely diverse microscopic, single-celled organisms that do not contain a nucleus; comprise one of the three domains of life, along with bacteria and complex life

Bacilli: Rod-shaped bacteria

Bacteria: Single-celled microscopic organisms that are the chief inhabitants of the microbiome

Bacteriophage: Complex virus that attaches to surface of a host and then uses a sheath-like syringe to inject its nucleic acid into the target cell.

Capsid: Protein shell that surrounds viral genetic material

Capsomeres: Individual structural units forming the viral capsid

Capsule: Gelatinous covering that keeps the bacterium from drying out

Cocci: Round or spherically-shaped bacteria

Dysbiosis: The term for microbial imbalance inside the body

Envelope: Spiky lipid membrane surrounding some viruses

Gram stain: Staining technique used to classify bacteria into one of two groups

Microbe: Microscopic organism, including bacteria, viruses, and fungi

Microbiota: The microbes within an individual microbial community (such as in the mouth or the gut)

Microbiome: The full complement of microbes (including bacteria, viruses, fungi, and archaea) living in and on the human body

Mycobiome: The community of fungi living on and in the human body

Pathogen: Disease-causing microorganism

Peptidoglycan: Substance in a bacterial cell wall; used to help identify bacteria as being gram negative or positive

Pili: Small, hair-like projections that allow bacteria to attach to other cells and surfaces

Plasmids: Small loops of bacterial DNA that allow DNA to be transferred from one bacterium to another

Portal of entry: Pathway by which infectious organisms gain access to the body

Prebiotic: Foods containing indigestible fibers that nourish and feed healthy bacteria in the gut

Probiotic: Supplement containing beneficial live bacteria taken to help seed the gut with health microbes

Spirilla: Spiral-shaped bacteria

Virus: Ultramicroscopic pathogen consisting of a nucleic acid within a protein shell

Own the Information

To make the information in this chapter part of your working memory, take some time to reflect on what you've learned. On a separate sheet of paper, write down everything you recall from the chapter. After you're done, log on to the *DavisPlus* website, and check out the Study Group podcast and Study Group Questions for the chapter.

Key Topics for Chapter 4:

- Findings of the Human Microbiome Project
- Why the microbiome is important
- How individuals acquire their microbiomes
- Role of the microbiome in health and disease
- Stages in the development of the microbiome
- Ways to enhance and nourish the microbiome
- Components of the microbiome
- Effect of antibiotics on the microbiome
- Structural components of bacteria
- Structural components of viruses
- How viruses replicate
- Role of archaea and fungi in the microbiome

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Test Your Knowledge

1. What was the goal of the Human Microbiome Project?
 - a. To sequence the human genome
 - b. To identify disease-causing microorganisms
 - c. To identify microorganisms residing within and on healthy adults
 - d. To discover whether bacteria contain DNA
2. The Human Microbiome Project discovered that healthy adults:
 - a. harbor more bacterial cells than they have human cells.
 - b. harbor a significant number of bacterial cells but still have more human cells than bacterial cells.
 - c. have no bacterial cells, confirming that bacteria cause disease.
 - d. harbor very few bacterial cells.
3. What is the most significant step in microbiome development?
 - a. The introduction of solid food
 - b. Bottle feeding
 - c. Administration of immunizations
 - d. The birth process
4. Which statement about the human microbiome is most accurate?
 - a. Every healthy adult carries a mix of microorganisms that is basically similar, except for a few minor variations.
 - b. The components of the microbiome are basically the same from one part of the body to another.
 - c. The components of the microbiome vary considerably between sites on the body and between individuals.
 - d. A healthy microbiome should be free from any disease-causing bacteria.
5. Which statement about bacteria is most accurate?
 - a. Bacteria are microscopic cells that contain a nucleus and organelles.
 - b. The one consistent feature among all bacterial species is the composition of the cell wall.
 - c. Bacteria have the ability to transmit DNA from one bacterium to another.
 - d. All bacteria have the same basic shape.
6. What effect do bacterial genes have on human health?
 - a. Bacterial genes exert some effect, although human DNA exerts a greater effect.
 - b. Bacterial genes have just as great an influence on human health as human genes do.
 - c. Bacteria within the microbiome stay within their own community; therefore, their genes do not influence health.
 - d. Bacteria do not have genes.
7. What purpose does the capsule serve in bacteria?
 - a. It gives the cell its shape.
 - b. It regulates the flow of materials into and out of the cell.
 - c. It synthesizes proteins.
 - d. It helps ward off attack by larger microorganisms.
8. Which statement most accurately describes viruses?
 - a. Viruses are not cells but, rather, are bundles of genetic material surrounded by a protein shell.
 - b. Viruses are single-celled microscopic organisms that inhabit almost every environment on earth.
 - c. Viruses are often categorized through Gram staining.
 - d. Viruses have a cell wall that consists of peptidoglycan.
9. What is the most common way a person's microbiome can become disrupted?
 - a. Acquisition of a bacterial infection
 - b. Acquisition of a viral infection
 - c. Ingestion of alcohol
 - d. Use of broad-spectrum antibiotics
10. Imbalances in the microbiome have been linked to which of the following disorders?
 - a. Asthma
 - b. Heart disease
 - c. Obesity
 - d. All of the above
11. Which technology has been shown to be effective in treating *Clostridium difficile* infections?
 - a. Lithotripsy
 - b. Kidney transplant
 - c. Blood transfusion
 - d. Fecal transplant

Own the Information

To make the information in this chapter part of your working memory, take some time to reflect on what you've learned. On a separate sheet of paper, write down everything you recall from the chapter. After you're done, log on to the *DavisPlus* website, and check out the Study Group podcast and Study Group Questions for the chapter.

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- Effect of antibiotics on the microbiome
- Structural components of bacteria
- Structural components of viruses
- How viruses replicate
- Role of archaea and fungi in the microbiome

Own the Information

Exercises ask students to identify the most important points in each chapter and then compare their lists to the author's learning objectives.

Life Lessons

Clinical applications show students how anatomy and physiology relate to daily living.

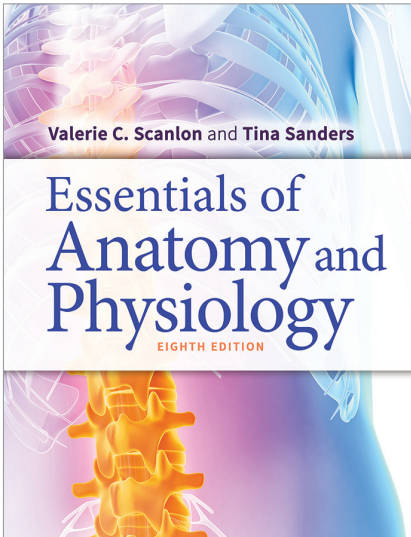
Life lesson: The microbiome and treatment response

Practitioners have long known that no medication is 100% effective; at the same time, medications may also produce adverse effects in certain individuals for unknown reasons. New research suggests that whether a medication is effective, as well as whether someone experiences an adverse reaction, may depend on the composition of the individual's microbiome.

For example, some patients have inexplicably experienced liver toxicity after taking the drug acetaminophen (commonly known as Tylenol). Now, however, scientists suspect that the adverse reaction may result when specific gut microbes alter how the drug is metabolized. As another example, the drug metformin—used to treat type 2 diabetes—seems to owe its effectiveness to the fact that it stimulates the growth of gut microbes that foster a more efficient response to glucose metabolism.

The mix of microbes within the intestines can also determine whether someone reaps health benefits from certain foods. For example, nutritionists have long touted the cancer-protective properties of a diet rich in soy. However, research has shown that the benefits from such a diet occur when soy interacts with specific bacteria to produce a certain metabolite. Unfortunately, only 25% to 30% of adults from Western countries produce this metabolite, compared with 50% to 60% of adults from Japan, Korea, or China. Therefore, because most people from Western countries lack the bacteria that makes this metabolite possible, they may not experience health benefits from eating soy.

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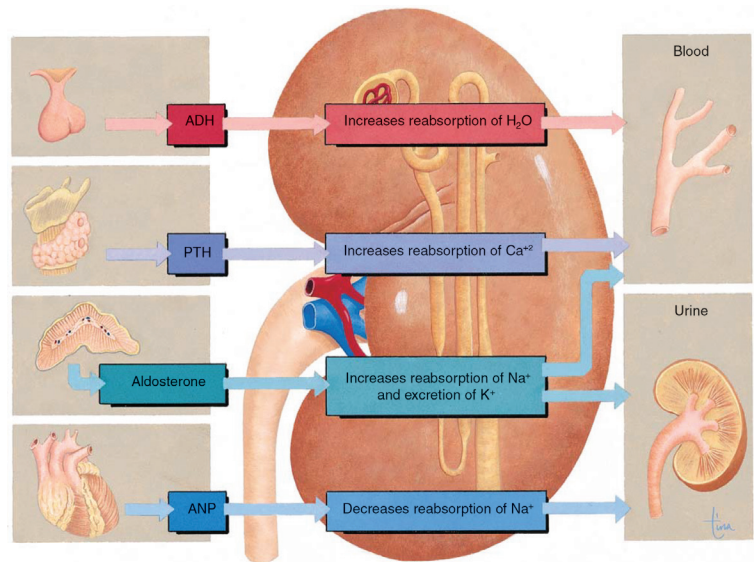
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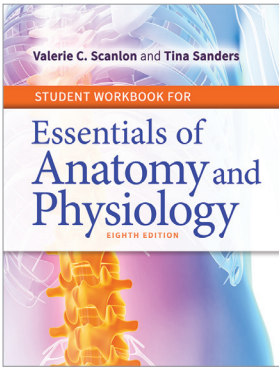
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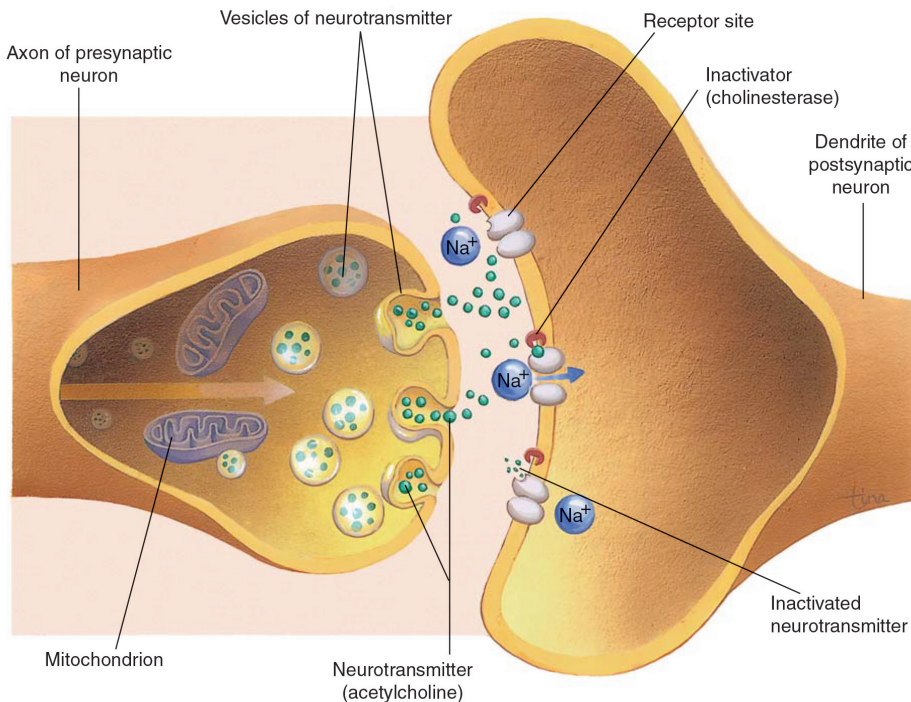
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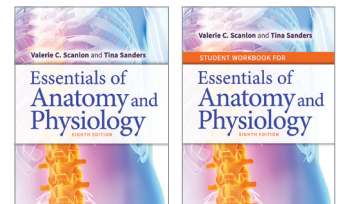
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