FIFTH EDITION

SHORT COURSE IN MEDICAL TERMINOLOGY

Engage, Learn, Apply, Reflect

Judi L. Nath

JONES & BARTLETT
LEARNING

World Headquarters
Jones & Bartlett Learning
25 Mall Road
Burlington, MA 01803
978-443-5000
info@jblearning.com
www.jblearning.com

Jones & Bartlett Learning books and products are available through most bookstores and online booksellers. To contact Jones & Bartlett Learning directly, call 800-832-0034, fax 978-443-8000, or visit our website, www.jblearning.com.

Substantial discounts on bulk quantities of Jones & Bartlett Learning publications are available to corporations, professional associations, and other qualified organizations. For details and specific discount information, contact the special sales department at Jones & Bartlett Learning via the above contact information or send an email to specialsales@jblearning.com.

Copyright © 2024 by Jones & Bartlett Learning, LLC, an Ascend Learning Company

All rights reserved. No part of the material protected by this copyright may be reproduced or utilized in any form, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission from the copyright owner.

The content, statements, views, and opinions herein are the sole expression of the respective authors and not that of Jones & Bartlett Learning, LLC. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not constitute or imply its endorsement or recommendation by Jones & Bartlett Learning, LLC and such reference shall not be used for advertising or product endorsement purposes. All trademarks displayed are the trademarks of the parties noted herein. *Short Course in Medical Terminology, Fifth Edition* is an independent publication and has not been authorized, sponsored, or otherwise approved by the owners of the trademarks or service marks referenced in this product.

There may be images in this book that feature models; these models do not necessarily endorse, represent, or participate in the activities represented in the images. Any screenshots in this product are for educational and instructive purposes only. Any individuals and scenarios featured in the case studies throughout this product may be real or fictitious but are used for instructional purposes only.

The authors, editor, and publisher have made every effort to provide accurate information. However, they are not responsible for errors, omissions, or for any outcomes related to the use of the contents of this book and take no responsibility for the use of the products and procedures described. Treatments and side effects described in this book may not be applicable to all people; likewise, some people may require a dose or experience a side effect that is not described herein. Drugs and medical devices are discussed that may have limited availability controlled by the Food and Drug Administration (FDA) for use only in a research study or clinical trial. Research, clinical practice, and government regulations often change the accepted standard in this field. When consideration is being given to use of any drug in the clinical setting, the healthcare provider or reader is responsible for determining FDA status of the drug, reading the package insert, and reviewing prescribing information for the most up-to-date recommendations on dose, precautions, and contraindications, and determining the appropriate usage for the product. This is especially important in the case of drugs that are new or seldom used.

27325-0

Production Credits
Vice President, Product Management: Marisa R. Urbano
Vice President, Content Strategy and Implementation: Christine Emerton
Director, Product Management: Matthew Kane
Product Manager: Bill Lawrensen
Director, Content Management: Donna Gridley
Manager, Content Strategy: Carolyn Pershouse
Content Strategist: Ashley Malone
Content Coordinator: Jessica Covert
Director, Project Management and Content Services: Karen Scott
Manager, Program Management: Kristen Rogers
Project Manager: Angela Montoya
Project Manager: Belinda Thresher
Digital Project Specialist: Carolyn Downer
Marketing Manager: Mark Adamiak
Content Services Manager: Colleen Lamy
Vice President, Manufacturing and Inventory Control: Therese Connell
Product Fulfillment Manager: Wendy Kilborn
Composition: Straive
Project Management: Straive
Cover and Text Design: Briana Yates
Media Development Editor: Faith Brosnan
Rights & Permissions Manager: John Rusk
Rights Specialist: Robin Silverman
Cover: © Magic mine/Shutterstock
Chapter Opener: © Matthew25/Shutterstock.
Printing and Binding: Lakeside Book Company

Library of Congress Cataloging-in-Publication Data
Library of Congress Cataloging-in-Publication Data unavailable at time of printing.

LCCN: 2022045884

6048

Printed in the United States of America
27 26 25 24 23 10 9 8 7 6 5 4 3 2 1

This book is dedicated to students who
challenge themselves. Thank you!

Brief Contents

New to This Edition xi
Author's Preface xv
User's Guide xvii
Reviewers xix
Acknowledgments xxi

CHAPTER 1 **Analyzing Medical Terms** 1
CHAPTER 2 **Common Prefixes and Suffixes** 9
CHAPTER 3 **Organization of the Body** 27
CHAPTER 4 **The Integumentary System** 39
CHAPTER 5 **The Skeletal System** 59
CHAPTER 6 **The Muscular System** 87
CHAPTER 7 **The Nervous System** 103
CHAPTER 8 **The Special Senses of Sight and Hearing** 127
CHAPTER 9 **The Endocrine System** 151
CHAPTER 10 **The Cardiovascular System** 171
CHAPTER 11 **The Lymphatic System and Immunity** 199
CHAPTER 12 **The Respiratory System** 215
CHAPTER 13 **The Digestive System** 239
CHAPTER 14 **The Urinary System** 261
CHAPTER 15 **The Reproductive System** 279

© matthew25/Shutterstock

APPENDIX A Answers to In-Text Questions 307
APPENDIX B Glossary of Word Parts with Meanings 337
APPENDIX C Glossary of Abbreviations 343
APPENDIX D Error-Prone Abbreviations, Symbols, and Dose Designations 347
APPENDIX E Top 100 Prescribed Medications 351
Index 355

Contents

New to This Edition . . . . . **xi**
Author's Preface . . . . . **xv**
User's Guide . . . . . **xvii**
Reviewers . . . . . **xix**
Acknowledgments . . . . . **xxi**

CHAPTER 1 Analyzing Medical Terms **1**

Introduction 1
Acquiring and Using Language Sense 2
Medical Term Parts 2
Analyzing Terms 3

CHAPTER 2 Common Prefixes and Suffixes **9**

Introduction 9
Word Roots Introduced in This Chapter 10
Categories of Prefixes 10
- Prefixes of Time and Speed 10
- Prefixes of Direction 11
- Prefixes of Position 11
- Prefixes of Size and Number 12
- Prefixes of Negation 13

Categories of Suffixes 13
- Suffixes Signifying Medical Conditions 13
- Suffixes Signifying Diagnostic Terms, Tests, and Surgical Procedures 14
- Suffixes That Signify Medical Practices and Practitioners 15
- Suffixes That Denote Adjectives 15

CHAPTER 3 Organization of the Body **27**

Introduction 27
Word Parts Related to Body Organization 28
Levels of Organization 28
- Cells 28
- Tissues 28
- Organs 28
- Systems 28

Navigating the Body 28
- Anatomic Position 30
- Directional Terms 30
- Body Planes 32

Body Cavities and Divisions 32
- Divisions of the Abdominopelvic Cavity 32
- Regions of the Spinal Column 34

CHAPTER 4 The Integumentary System **39**

Introduction 39
Word Parts Related to the Integumentary System 40
Structure and Function 40
Disorders Related to the Integumentary System 42
- Burns 42
- Skin Lesions 42
- Inflammatory Disorders 43
- Skin Cancer 43
- Skin Infections 44
- Other Skin Disorders 44

Diagnostic Tests, Treatments, and Surgical Procedures 45
Practice and Practitioners 46

CHAPTER 5 The Skeletal System **59**

Introduction 59
Word Parts Related to the Skeletal System . . . 59
Structure and Function 61
- The Axial Skeleton 62
- The Appendicular Skeleton 63
- Joints 67

Disorders Related to the Skeletal System 67
Diagnostic Tests, Treatments, and Surgical Procedures 70
Practice and Practitioners 70

© matthew25/Shutterstock

CHAPTER 6 The Muscular System 87

Introduction 87
Word Parts Related to the Muscular System . . 88
Structure and Function 88
Skeletal Muscle 88
Smooth Muscle 88
Cardiac Muscle 90
Disorders Related to the Muscular System . . . 90
Chronic Disorders 90
Cumulative Trauma and Sports Injuries 90
Paralysis and Paresis 91
Diagnostic Tests, Treatments, and Surgical Procedures 91
Practice and Practitioners 92

CHAPTER 7 The Nervous System 103

Introduction 103
Word Parts Related to Nervous System 105
Structure and Function 105
Central Nervous System (CNS) 106
Peripheral Nervous System (PNS) 107
Disorders Related to the Nervous System . . . 108
Trauma 108
Vascular Insults 109
Tumors 109
Systemic Degenerative Diseases 109
Seizures 110
Behavioral Disorders 110
Diagnostic Tests, Treatments, and Surgical Procedures 110
Practice and Practitioners 111

CHAPTER 8 The Special Senses of Sight and Hearing 127

Introduction 127
Word Parts Related to the Eye 128
Structure and Function of the Eye 128
Disorders Related to the Eye 131
Diagnostic Tests, Treatments, and Surgical Procedures of the Eye 132
Practice and Practitioners of the Eye 132
Word Parts Related to the Ear 132
Structure and Function of the Ear 133
Disorders Related to the Ear 133
Diagnostic Tests, Treatments, and Surgical Procedures of the Ear 134
Practice and Practitioners of the Ear 135
Abbreviations 135

CHAPTER 9 The Endocrine System 151

Introduction 151
Word Parts Related to the Endocrine System 151
Structure and Function 152
Pituitary Gland 152
Thyroid Gland and Parathyroid Gland 155
Adrenal Glands 155
Pancreas 156
Gonads 156
Disorders Related to the Endocrine System . 156
Disorders of the Pituitary Gland 156
Disorders of the Thyroid Gland 156
Disorders of the Adrenal Gland 157
Disorders of the Pancreas 158
Diagnostic Tests, Treatments, and Surgical Procedures 158
Practice and Practitioners 158

CHAPTER 10 The Cardiovascular System 171

Introduction 171
Word Parts Related to the Cardiovascular System 172
Structure and Function 173
The Heart 173
The Heartbeat 175
Blood Vessels 177
Blood 178
Disorders Related to the Cardiovascular System 179
Coronary Artery Disease 179
Blood Clots 179
Myocardial Infarction and Congestive Heart Failure 179
Arrhythmias 179
Hypertension 180
Blood Disorders 180
Diagnostic Tests, Treatments, and Surgical Procedures 180
Practice and Practitioners 180

CHAPTER 11 The Lymphatic System and Immunity 199

Introduction 199

Word Parts Related to the Lymphatic System and Immunity . . . 200
Structure and Function . . . 201
Disorders Related to the Lymphatic System and Immunity . . . 202
Diagnostic Tests, Treatments, and Surgical Procedures . . . 203
Practice and Practitioners . . . 203

CHAPTER 12 The Respiratory System . . . 215

Introduction . . . 215
Word Parts Related to the Respiratory System . . . 216
Structure and Function . . . 216
The Nose, Nasal Cavity, and Paranasal Sinuses . . . 216
The Pharynx and Tonsils . . . 218
The Larynx and Trachea . . . 219
The Trachea, Bronchi, Bronchioles, and Alveoli . . . 219
The Lungs . . . 219
The Diaphragm . . . 220
Disorders Related to the Respiratory System . . . 221
Infectious Disorders . . . 221
Obstructive Lung Diseases . . . 221
Expansion Disorders . . . 222
Diagnostic Tests, Treatments, and Surgical Procedures . . . 222
Practice and Practitioners . . . 223

CHAPTER 13 The Digestive System . . . 239

Introduction . . . 239
Word Parts Related to the Gastrointestinal System . . . 240
Structure and Function . . . 241
Major Organs of the Digestive Tract . . . 241
Accessory Organs . . . 243
Disorders Related to the Digestive System . . . 244
Disorders of the Lower Gastrointestinal Tract . . . 244
Disorders of the Accessory Organs of the Digestive System . . . 245
Diagnostic Tests, Treatments, and Surgical Procedures . . . 245
Practice and Practitioners . . . 246

CHAPTER 14 The Urinary System . . . 261

Introduction . . . 261
Word Parts Related to the Urinary System . . . 262
Structure and Function . . . 263
Disorders Related to the Urinary System . . . 264
Diagnostic Tests, Treatments, and Surgical Procedures . . . 264
Practice and Practitioners . . . 265

CHAPTER 15 The Reproductive System . . . 279

Introduction . . . 279
Word Parts Related to the Reproductive System . . . 279
Structure and Function . . . 280
The Male Reproductive System . . . 281
The Female Reproductive System . . . 283
Pregnancy . . . 284
Terms Associated with Pregnancy . . . 285
Disorders Related to the Reproductive System . . . 286
Sexually Transmitted Diseases . . . 286
Inflammation . . . 286
Female Structural Abnormalities . . . 287
Tumors . . . 287
Menstrual Cycle Disorders . . . 288
Disorders That Affect Males . . . 288
Diagnostic Tests, Treatments, and Surgical Procedures . . . 288
Practice and Practitioners . . . 289

APPENDIX A Answers to In-Text Questions . . . 307

APPENDIX B Glossary of Word Parts with Meanings . . . 337

APPENDIX C Glossary of Abbreviations . . . 343

APPENDIX D Error-Prone Abbreviations, Symbols, and Dose Designations . . . 347

APPENDIX E Top 100 Prescribed Medications . . . 351

Index . . . 355

New to This Edition

This new edition builds on the foundation established in the previous four editions. The reader will find the writing style of this edition easy to follow, with special focus given to ensuring that each page is user friendly, accessible to all learning levels, and sensitive to diversity, equity, and inclusion issues. As an educator, I wanted to be sure that students found the content manageable, interesting, and understandable.

Approach and Content Organization

This section outlines the global changes that were made throughout the entire textbook as well as the chapter-by-chapter changes. Changes across all chapters are introduced first.

Global Changes

- The narrative has been modernized to make the text user-friendly and approachable.
- To engage readers, each chapter begins with a relevant Case Study. This Case Study wraps up at the end of the chapter and is followed by Case Study Application Questions. This follows the model of **Engage**, **Learn**, and **Apply**.
- A **Reflection** section finishes each chapter and allows readers to think about what they have learned with directed questions.
- Study Tables may contain terms that are not in the narrative; however, most bold-faced terms in the narrative are found in the Study Tables. The book would be unwieldy with text if the terms in the tables were also in the narrative. The most relevant terms were selected for inclusion in the tables.
- All terminology has been updated so that terms are current and match words used in common practice.
- Appendixes A through E have been updated so the information is the most current and nationally recognized.

Basic Chapter Outline

1. Learning Outcomes
2. Case Study
3. Introduction
4. Word Parts Related to the XXX System
5. Structure and Function
6. Quick Check (at least one per chapter)
7. Disorders Related to the XXX System
8. Diagnostic Tests, Treatments, and Surgical Procedures
9. Practice and Practitioners
10. The XXX System Abbreviation Table
11. Sidebar (at least one per chapter)
12. The XXX System Study Table (alphabetized within subheadings)
    - Structure and Function
    - Disorders
    - Diagnostic Tests, Treatments, and Surgical Procedures
    - Practice and Practitioners
13. Case Study Wrap-Up
14. Case Study Application Questions
15. End-of-Chapter Exercises—not all exercises may be present, but the order of exercises is maintained
    - Exercise X-X Labeling
    - Exercise X-X Word Parts
    - Exercise X-X Word Building
    - Exercise X-X Matching
    - Exercise X-X Multiple Choice
    - Exercise X-X Fill in the Blank
    - Exercise X-X Abbreviations
    - Exercise X-X Spelling
    - Exercise X-X Medical Report
16. Reflection

Chapter-by-Chapter Changes

Chapter 1 Analyzing Medical Terms

- New Case Study: Greta's Losing Her Groove
- Updated section on word root, *ped/o*
- Updated Table 1-1
- Updated Table 1-3

© matthew25/Shutterstock

Chapter 2 Common Prefixes and Suffixes
- New Case Study: Bear's Bad Day
- Updated Table 2-2
- Updated Table 2-4
- Updated Table 2-5

Chapter 3 Organization of the Body
- New Case Study: Trayvon's Tibia
- Revised Table 3-3
- Revised Table 3-5
- Revised Study Table, Body Position and Directional Terms
- New Terms: sagittal section, transverse section

Chapter 4 The Integumentary System
- New Case Study: Hot Tub Hives
- Revised section on skin cancer
- Revised section on liquid nitrogen

Chapter 5 The Skeletal System
- New Case Study: Fall in February
- Revised section on axial skeleton
- Revised section on joint movements
- New Terms: osteoblast and osteoclast

Chapter 6 The Muscular System
- New Case Study: My Head Is Heavy
- New Abbreviation: MRI
- Updated section on amyotrophic lateral sclerosis (ALS)
- New Terms: blood tests, lumbar puncture, magnetic resonance imaging, muscle biopsy, myopathy, nerve conduction studies, polymyositis, rheumatologist, spinal tap, and urine tests

Chapter 7 The Nervous System
- New Case Study: Pierce Can No Longer Play
- New Abbreviations: CP and MG
- New Terms: amyotrophic lateral sclerosis, cerebral palsy, electromyography, nerve conduction study, spina bifida, and torticollis

Chapter 8 The Special Senses of Sight and Hearing
- New Case Study: Purple Rain
- Updated section on disorders related to the eye
- Changed sidebar information on abbreviations from AU to AS
- New Terms: floaters, retinal detachment, vitrectomy

Chapter 9 The Endocrine System
- New Case Study: Felicity's Fatigue
- New Abbreviations: HbA1c, HRT, and OXT
- Updated diabetes mellitus section
- New Terms: gestational diabetes, lactotropin, parathormone, polyphagia, prediabetes, urinalysis, and vasopressin

Chapter 10 The Cardiovascular System
- New Case Study: Brian's Blood Bruise
- New Abbreviations: DVT, ECG, PA, PE, and US
- Updated MONA to THROMBINS$_2$
- New Terms: cardiac ablation, cardiothoracic surgeon, coronary sinus, deep vein thrombosis, embolism, murmur, physician assistant, pulmonary embolism, thrombus, and thromboembolism

Chapter 11 The Lymphatic System and Immunity
- New Case Study: Piano Playing Petra
- New Abbreviations: CRP test
- New Terms: C-reactive protein (CRP) test, ibuprofen, rheumatologist

Chapter 12 The Respiratory System
- New Case Study: My Child Tastes Salty
- New Abbreviations: CT
- Revised sections on tonsils and respiratory system disorders
- Added a sidebar on the difference between mucous and mucus
- New Terms: hypercapnia, hypercarbia, and mucolytic

Chapter 13 The Digestive System
- New Case Study: Mario's Malaise
- New Abbreviations: BP, GP, HTN, IBD, LGI, UGI, SOB, UC, WBC
- New Terms: colostomy, gastrostomy, H2-receptor antagonists, icterus, ileostomy, inflammatory bowel disease, malaise, ostomy, stool studies, ulcerative colitis, vermiform appendix

Chapter 14 The Urinary System
- New Case Study: Skin Frost
- New Abbreviations: UACR
- Added a sidebar on the origin of the abbreviation GC for gonorrhea
- New Terms: azotemia, continuous ambulatory peritoneal dialysis, extracorporeal dialysis, glucosuria, pararenal fat, renomegaly, uremic frost, uresis, voiding

Chapter 15 The Reproductive System
- New Case Study: Paige's Problematic Pregnancy
- Deleted words: prostatomegaly, trachelitis
- New Terms: Cowper's gland, ductus deferens, estimated date of confinement, estimated date of delivery, gravid, hysterodynia, labor, leiomyoma, orchidectomy, placenta previa, sexually transmitted infection, spermatic cord, testicle, trachelectomy, prostate gland, spermatocyte, spermatozoa

Appendix E Top 100 Prescribed Medications
- Revised table

Other Resources

Online ancillary materials complement the text and provide additional support for student learning.

Student Resources

- Anatomy and Physiology Review Module
- Audio Glossary
- Flash Cards
- Worksheets
- Learning Objectives

Instructor Resources

- Slides in PowerPoint format and Lesson Plans include useful information to facilitate presentation of material by instructors.
- A Test Bank to test students' knowledge of key chapter content.
- Answer Keys to both in-text questions and Worksheets.
- Sample Syllabus
- Image Bank
- Lecture Outlines

Author's Preface

Welcome to the field of medical terminology. This workbook-textbook is intended to teach the language of medicine in an engaging and meaningful way. It is written to represent the real world so that you can move seamlessly from the classroom to actual practice. The approach is based on research that demonstrates how students learn best. To that end, each chapter begins with an engaging case study, followed by ample opportunity for learning and applying, and concludes with reflection. Learning and application use a three-pronged approach: (1) immersion—the terms are presented in context; (2) chunking—the material is given in manageable units; and (3) practice—exercises allow you to check your knowledge and your ability to apply concepts to new situations. Learning word parts is also an essential component of learning medical terms. If you learn the word parts tables, you will be well on your way to knowing medical terms you have never encountered because you can figure them out by breaking apart the new words into their component word parts. This will be quite useful, because not every word you will encounter in your careers is found in this book; but you will be equipped with the knowledge to understand the meaning of new words. Pay special attention to the analysis sections in the Study Tables, as these provide interesting, foundational information for forming medical terms.

While learning medical terminology, you will also learn some basic anatomy (body structures), physiology (body functions), and pathology (body diseases). Because medical terms describe the human body in health and in disease, attaining an elementary understanding of these topics will help you retain a working memory of medical language.

Learning medical terms can be easy if you approach the subject from a proper perspective. Begin by telling yourself that medical terms do not make up a separate language. Medical terms are simply words that you can add to your vocabulary. As with all words, medical words are meant to convey information.

As you enter a medical profession, you will be communicating with other medical professionals and with patients. Therefore, your job will include choosing words and sentence structures that communicate accurate information and reflect a professional attitude. Both your communication skills and your behavior toward patients are very important. As you are about to discover, learning medical terminology can be easy at times and challenging at others. However, if you use the textbook and its ancillaries to their fullest, you will be well on your way to mastering medical terminology.

Judi L. Nath, PhD, CHES
Lourdes University

© matthew25/Shutterstock

User's Guide

A Short Course in Medical Terminology, *Fifth Edition* was developed to provide an easy, efficient, and effective way to learn medical terminology. This User's Guide introduces the features of the book that help the learning experience.

A **logical organization** guides you through the basics of medical terminology, word parts, and word analysis.

Chapters 1 and 2 introduce the basics of word building and set the foundation for learning terms.

Chapters 3–15 offer an overview of each body system and introduce terms that identify the structure and function of that system along with terms that name system disorders, diagnostic tests, treatments, surgical procedures, practice, and practitioners.

Each chapter opens with a list of **Learning Outcomes**. These are measurable educational aims and objectives that indicate what you should be able to do after completing the chapter.

A chapter-specific **Case Study** follows the Learning Outcomes. Opening Case Studies engage you for learning, which prepares you for the **Case Study Application Questions** that are posed after the **Case Study Wrap-Up**.

An introduction and a tabular presentation of **Word Parts** related to a specific body system are presented next.

Word Parts Exercises offer you an opportunity to quickly review the word parts before moving on to new material.

Structure and Function sections with **full-color illustrations** help you learn basic anatomy and physiology using tight text–art integration.

Quick Checks are exercises that help reinforce your knowledge of term parts before studying disorders related to the body systems.

All body system chapters include an **Abbreviations Table**, which lists common abbreviations and their meanings used in the chapter.

Sidebars appear throughout to highlight interesting facts about medical terms and words in general.

All body system chapters include a **Study Table** summarizing terms for reinforcement of the material in an easy-to-reference format. Some terms in the table are not found in the running narrative, but they are important to include for general reference, or the terms are used in the end-of-chapter case study.

The **Case Study Wrap-Up** picks up where the introductory case study left off. This wrap-up provides additional information, using terminology learned in the chapter. It concludes with the **Case Study Application Questions** that allow you to apply your knowledge.

End-of-Chapter Exercises and a **Medical Report** close out each chapter to maximize learning. Exercises include figure labeling, word building, matching exercises, multiple-choice questions, fill in the blank, short answer, true/false, and spelling. The Medical Report and Case Study Wrap-Up provide real-world application of medical terms and give you an opportunity to interact with the chapter material as you would in a clinical setting.

Each chapter concludes with **Reflection** questions. Taking time to reflect and think about what you have just learned is an important piece for long-term growth and learning.

© matthew25/Shutterstock

Reviewers

The author and publisher would like to thank the following individuals who helped to review this textbook:

- Joel A. Bloom, PhD, MSE
  University of Houston—College of Education
- David R. Chicoine, DC, MS
  University of New England
- Perla Gilman, MS, MLS (ASCP)
  Bunker Hill Community College
- Dana Griffin, MBA, MLS (ASCP)
  Madonna University
- Kay Smith, MSN, RN
  Bluegrass Community and Technical College

© matthew25/Shutterstock

Acknowledgments

With sincere gratitude, I wish to acknowledge all the hard work done by members of the editorial staff. Writing and publishing a textbook requires more than putting fingers to the keyboard. The printed book represents the work of many dedicated individuals, without whom this project could not be completed. To begin, thanks to Product Manager, Bill Lawrensen, for valuing the fourth edition enough that a fifth edition was necessary. Another round of thanks to content strategist, Ashley R. Malone, who was my day-to-day point person; you were always quick to answer and helpful with your responses. Thank you to copy editor, Sheryl Nelson, whose keen eyes aided manuscript preparation. Special thanks to ancillary writer, Anjali Dogra Gray, PhD Textbooks require solid ancillary packages, and her work is greatly appreciated.

© matthew25/Shutterstock