

A scanning electron micrograph (SEM) of cells, likely red blood cells, showing their characteristic biconcave disc shape. The cells are highlighted in a vibrant red color, contrasting with the darker, more textured background of the surrounding cellular environment. The image is used as a background for the book cover.

Lee-Ellen Copstead | Jacquelyn Banasik

PATHOPHYSIOLOGY

FIFTH EDITION

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FIFTH EDITION

PATHOPHYSIOLOGY

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Library of Congress Cataloging-in-Publication Data

Copstead, Lee Ellen.

Pathophysiology/Lee-Ellen C. Copstead, Jacquelyn L. Banasik. -- 5th ed.
p.; cm.

Includes bibliographical references and index.

ISBN 978-1-4557-2650-9 (pbk.: alk. paper)

I. Banasik, Jacquelyn L. II. Title.

[DNLM: 1. Disease. 2. Pathology. QZ 140]

616.07--dc23

2012037206

Vice President and Publisher: Loren Wilson

Senior Content Strategist: Sandra Clark

Senior Content Development Specialists: Karen C. Turner and Charlene Ketchum

Senior Content Coordinator: Brooke Kannady

Publishing Service Manager: Jeffrey Patterson

Senior Project Manager: Jeanne Genz

Senior Book Designer: Amy Buxton

Multimedia Producer: Anitha Sivaraj

Printed in China

Last digit is the print number: 9 8 7 6 5 4 3 2 1

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To:

*My now teenaged daughter, Amelia Charlotte Kirkhorn,
who reminds me daily that there is always more to learn.*

LECK

To:

Loved ones, past and present, who give meaning to the work.

JLB

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The scientific basis of pathophysiology is rapidly expanding and becoming increasingly well understood at the genetic and cellular levels. Progress in human genetics and epigenetics has transformed our understanding of physiology and disease. To be clinically relevant and useful to health care students and professionals, a text must be able to synthesize a vast amount of detailed knowledge into overarching concepts that can be applied to individual diseases. As in previous editions, the fifth edition of *Pathophysiology* gives attention to the development of practical, student-centered learning aids that support learning and mastery of content. Discussions of relevant biochemistry, genetics, and cell physiology are used to help students understand concepts at a deeper level. This fifth edition has been updated extensively with sensitivity to the unique needs of today's students to better prepare them as practitioners in an ever-changing health care environment.

ORGANIZATION

Pathophysiology is a comprehensive text and reference that uses a systems approach to content, beginning with a thorough treatment of normal physiology, followed by pathophysiology and application of concepts to specific disorders. The text is organized into 15 units, each of which includes a particular system or group of interrelated body systems and the pertinent pathophysiologic concepts and disorders.

Unit I: Pathophysiologic Processes (Chapters 1 and 2) sets the stage for understanding major elements of the pathophysiologic processes in individuals and population groups. The purpose of these chapters is to give students an appreciation for the complex nature of disease and illness, including sociocultural influences, global health considerations, and the significant contributions of stress, adaptation, and coping. The unifying concepts of pathophysiologic processes—etiology, pathogenesis, clinical manifestations, and implications for treatment of disease—are explained. A new section on telomeres and telomerase and their relationship to stress and aging is presented in Chapter 2.

Unit II: Cellular Function (Chapters 3 to 7) addresses cellular mechanisms of physiology and disease. Chapter 3 describes normal cells to give students an insight into how cells function, with an emphasis on cellular signaling and communication. Chapter 4 discusses cellular pathology and the processes of injury, apoptosis, aging, and death. Chapters 5 and 6 describe gene structure, function and regulation, development, and genetic and congenital disorders. Chapter 7 describes the cellular biology of tumor growth, focusing on the roles of proto-oncogenes and tumor suppressor genes. Revisions reflect new knowledge about apoptosis, genetics, and cancer biology.

Unit III: Defense (Chapters 8 to 12) addresses key cellular defense mechanisms and the basic processes of infectious disease, inflammation, immunity, autoimmune disease,

hypersensitivity, hematologic malignancies, and HIV-AIDS. Unit III was revised to reflect new knowledge about immune mechanisms and therapy for HIV disease as well as global health considerations for HIV-AIDS.

Unit IV: Oxygen Transport, Blood Coagulation, Blood Flow, and Blood Pressure (Chapters 13 to 16) includes content pertaining to the transport of oxygen in the circulation, hemostasis, vascular regulation of flow, blood pressure regulation, and the pathologies relevant to these functions. Content on blood pressure was updated to reflect current practice recommendations.

Unit V: Cardiac Function (Chapters 17 to 20) includes concepts related to cardiac physiology and pathophysiology. Content has been updated to reflect new knowledge in the areas of apoptosis and regeneration of cardiac cells, heart failure, and shock.

Unit VI: Respiratory Function (Chapters 21 to 23) provides a thorough description of pulmonary anatomy and physiology including concepts of ventilation, perfusion, and gas exchange. Differences between obstructive and restrictive diseases are highlighted.

Unit VII: Fluid, Electrolyte, and Acid-Base Homeostasis (Chapters 24 and 25) describes concepts basic to understanding the alterations in fluid, electrolyte, and acid-base homeostasis that accompany many disease processes.

Unit VIII: Renal and Bladder Function (Chapters 26 to 29) provides a thorough description of renal anatomy and physiology, abnormalities of renal function, bladder dysfunction, and strategies for interpreting common laboratory values in the context of kidney or bladder diseases. Chapters on renal disorders, chronic kidney disease, and disorders of the urinary tract have been extensively revised.

Unit IX: Genital and Reproductive Function (Chapters 30 to 34) includes comprehensive, current information on male and female genital anatomy, embryology, and reproductive physiology as well as discussion of common disorders. Chapter 34 provides thorough coverage of common sexually transmitted infections.

Unit X: Gastrointestinal Function (Chapters 35 to 38) provides a review of normal gastrointestinal anatomy, physiology, and disorders, with separate chapters dedicated to pancreatic and biliary dysfunction and liver disease.

Unit XI: Endocrine Function, Metabolism, and Nutrition (Chapters 39 to 42) addresses alterations in endocrine control, metabolism, and nutrition. The chapter on normal endocrine physiology includes a detailed discussion of hormone synthesis, activity, and regulation. A separate chapter is dedicated to the growing problem of type 2 diabetes mellitus.

Unit XII: Neural Function (Chapters 43 to 47) includes a review of neurologic anatomy and physiology, acute and chronic neuronal disorders, disorders of special senses, and pain. Content has been updated to reflect new information on Alzheimer disease and Parkinson disease.

Unit XIII: Neuropsychological Function (Chapters 48 and 49) covers current concepts in the pathophysiology of psychobiology including anxiety, mood, thought, and personality disorders. New to the fifth edition is inclusion of global health considerations in mental health. Chapter 49 was completely rewritten to reflect current insights about disorders commonly seen in clinical practice and updated with a focused discussion of global health and pathophysiologic implications of depression.

Unit XIV: Musculoskeletal Support and Movement (Chapters 50 to 52) includes alterations in musculoskeletal support and movement, with separate chapters dedicated to normal bone and muscle anatomy and physiology, disorders of bone and muscle, and rheumatic disorders.

Unit XV: Integumentary System (Chapters 53 and 54) includes alterations affecting the largest system of the body—the integumentary system. Chapter 53 includes normal integumentary structure and function and a survey of common skin disorders. Chapter 54 covers burn injury, emphasizing the multiple stresses that are encountered in patients with these complex injuries.

FEATURES

An understanding of normal structure and function of the body is necessary for any detailed understanding of its abnormalities and pathophysiology. The first chapter in most units includes a fully illustrated *review of normal physiology*. *Global Health Considerations*, where pertinent, are highlighted in separate boxes. Changes in structure and function as a result of normal development and aging are also addressed where appropriate. Age-related concepts are highlighted in boxes titled *Geriatric Considerations* and *Pediatric Considerations*.

Each chapter opens with *Key Questions*, which are designed to develop a strong pathophysiologic knowledge base and to serve as the foundation for critical thinking. These Key Questions integrate the essential information in each chapter, emphasizing *concepts* rather than small details. *Chapter Outlines* are also included at the beginning of each chapter to help the reader locate specific content. Within every chapter, *Key Points* are identified at the end of every major discussion and are presented in short bulleted lists. These recurring summaries help readers to focus on the main points.

Nearly 900 illustrations elucidate both normal physiology and pathophysiologic changes. The entire book is in *full color*,

with color used generously in the illustrations to better explain pathophysiologic concepts.

To help students master the new vocabulary of pathophysiology, key terms appear in boldface within each chapter, and these terms are defined in a comprehensive *Glossary*, which appears at the end of the text. Throughout this text, the nonpossessive forms of eponyms (e.g., Down syndrome) are used consistently when referring to the person for whom a disease is named. Clinical and laboratory values are provided in the *Appendix*.

ANCILLARIES

Student Learning Resources on Evolve

The student section of the book's website hosted on Evolve offers nearly 700 *Student Review Questions* in a variety of question formats, an *Audio Glossary*, *Animations* to help readers visualize pathophysiologic processes, *Case Studies with questions*, **Key Points** review, and answers to *Key Questions*. Visit the Evolve website at <http://evolve.elsevier.com/Copstead/>.

Study Guide

Pathophysiology can be a daunting subject for students because of the large volume of factual material to be learned. The student **Study Guide** is designed to help students focus on important pathophysiologic concepts. Questions to check recall of normal anatomy and physiology are included for each chapter. A number of activities that help the student focus on similarities and differences between often-confused pathologic processes are included. More than 1500 *Self-assessment test questions* with answers are included to help students check their understanding and build confidence for examinations. *Case studies*, with more than 250 questions including rationales for correct and incorrect answers, are used to help students begin to apply pathophysiologic concepts to clinical situations.

Instructor Learning Resources on Evolve

The **Instructor's Resources** on Evolve provide a number of teaching aids for instructors who require the text for their students. The materials include a *Test Bank* presented in Exam View with approximately 1200 test items, a *Teach for Nurses instructor manual* detailing the resources available to instructors for their lesson planning, a *PowerPoint lecture guide* with more than 4000 slides with integrated case studies and audience response questions to facilitate classroom presentations, and an *Image Collection* of more than 900 color images from the text.

ACKNOWLEDGMENTS

Many creative and unique efforts grace the pages of this work. It is exceedingly difficult to know how to best recognize every one. Writing this text has been possible only because of the tremendous dedication of authors, artists, reviewers, and editors. Our sincere gratitude goes to all who helped with this and previous editions. In particular, grateful appreciation is extended to all of the contributing authors—recognized experts—who gave exhaustively of their time to write chapters and create illustrations. We are also indebted to the many thoughtful experts who gave of their time to read and critique manuscripts and help ensure excellence in chapter content throughout the text.

No project of this magnitude could be accomplished without wonderfully supportive colleagues and students who provided a source of continual motivation and encouragement. We are most keenly aware of the inspiration provided by the faculty, staff, and students of Washington State University College of Nursing and the University of Wisconsin—Eau Claire College of Nursing and Health Sciences. Thank you to Assistant Professor of Nursing, Dr. Angela Stombaugh, for her contribution to the *Pediatric Considerations* boxes. Undergraduate nursing students Rachel Nerison and Anja Meerwald, and honors economics student, Laùrelyn Wieseman of the University of Wisconsin—Eau Claire, deserve mention for their enthusiastic support and scholarly review of the *Global Health Considerations* boxes included in the fifth edition.

Grateful recognition is made to the staff at Elsevier. In particular, Charlene Ketchum deserves our heartfelt thanks for helping us with developmental editing through two editions of the text. As our new senior content development specialist (who picked up the reins from Charlene), Karen Turner helped with the content, illustrations, and the many details to keep our

project on track; Jeanne Genz, our project manager, paid excellent attention to the copyediting, proofreading, and page layout. George Barile contributed extensively to the art program of the fifth edition. Assistant Brooke Kannady kept all of the details straight to help this edition run so smoothly. In addition, we owe grateful thanks to Nursing Editor Sandra Clark, who believed in the book and oversaw the revision of the fifth edition from beginning to end.

We would like to recognize those who provided a foundation for the revised text through their contributions to first editions: Mary Sanguinetti-Baird, Linda Belsky-Lohr, Tim Brown, Karen Carlson, Leslie Evans, Jo Annalee Irving, Debby Kaaland, Rick Madison, Maryann Pranulis, Edith Randall, Bridget Recker, Cleo Richard, Gary Smith, Pam Springer, Martha Snider, Patti Stec, Julie Symes, Lorie Wild, and Debra Winston-Heath. We also would like to thank those who contributed to the second and third editions of the book: Arnold A. Asp, Katherina P. Choka, Cynthia F. Corbett, Mark Puhlman, Barbara Bartz, Arnold Norman Cohen, Karen Groth, Christine M. Henshaw, Carolyn Hoover, Marianne Genge Jagmin, Linda Denise Oakley, Anne Roe Mealey, David Mikkelsen, Donna Bailey, Billie Marie Severtsen, and Jacqueline Siegel. Thank you also to the contributors of the fourth edition: Carolyn Spenee Cagle, Lorri Dawson, Patricia Garber, Jane Georges, Naomi Lungstrom, Sheila Smith, and Angela Starkweather.

To the late Dr. Michael J. Kirkhorn, we give acknowledgment and thanks for writing the first, second, and third edition's provocative and thoughtful essays that began each unit, and we thank Dr. Sheila Smith for her contribution to the fourth edition essays opening each of the units. We would also like to thank April Hart for her help with revising the glossary for this edition.

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