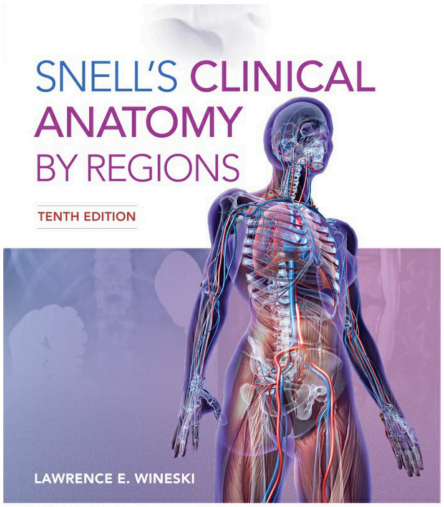


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To Karen

For your understanding, extraordinary patience, and unconditional support.

To Anatomical Donors

With the deepest appreciation to our essential teachers for your remarkable gifts.

In Memoriam

Richard S. Snell, MRCS, LRCP, MB, MD, PhD

1925–2015

Clinical Anatomy by Regions

Clinical Anatomy by Systems

Clinical Neuroanatomy

Clinical Embryology for Medical Students

Preface

It is my great honor to continue the work of Dr. Richard S. Snell in this new edition of his text. I have always admired this book, having used earlier editions as a student and as an instructor, and I appreciated the opportunity to contribute in a small way to the ninth edition. I hope this 10th edition meets Dr. Snell's high standards and will continue his legacy of scholarship and clinical relevance in teaching.

This book provides health science students a review of basic anatomy in a strong clinical context. It includes the following changes:

1. The order of chapters is modified and now follows a standard medical school dissection sequence.
2. The progression of topics in each chapter is revised, beginning with foundational material and building to more complex relations.
3. Each chapter begins with a list of Learning Objectives and concludes with a set of Key Concepts. The Learning Objectives introduce the primary topics in the chapter, i.e., the anatomy most important to learn and understand. The Key Concepts summarize the critical points of anatomy covered in that chapter.
4. The text is largely reworked throughout and includes new material and updated terminology. New tables provide succinct summaries of information.
5. New and/or updated illustrations better demonstrate points of anatomy, especially surface anatomy.

Each chapter follows a similar format. This makes it easier to locate material and facilitates moving from one part of the book to another. Each chapter centers on the following categories:

1. **Clinical Example:** A short case report that dramatizes the relevance of anatomy in medicine introduces the chapter.
2. **Learning Objectives:** As described above, this section focuses the student on the primary anatomy that is most important to learn and

understand.

3. **Basic Clinical Anatomy:** The bulk of the chapter provides basic information on gross anatomic structures of clinical importance. Clinical and Embryology Notes supplement the core text, indicate clinical applications, and explain adult morphology and major congenital malformations.
4. **Radiographic Anatomy:** Each chapter includes numerous standard medical images (e.g., radiographs, CT scans, MRI studies, and sonograms) to demonstrate normal anatomy in the manner most often observed by clinicians. Labeled photographs of cross-sectional anatomy stimulate students to think in terms of three-dimensional anatomy, which is so important in the interpretation of imaging studies.
5. **Surface Anatomy:** This section outlines surface landmarks and palpation points of important anatomic structures fundamental to a thorough physical examination.
6. **Key Concepts:** This closing part of the chapter summarizes the major points of anatomy discussed in the chapter to reinforce the topics covered.
7. **Review Questions:** A collection of review questions is available online at www.thePoint.lww.com. The purpose of these questions is threefold: to focus attention on areas of importance, to enable students to assess their areas of strength and weakness, and to provide a form of self-evaluation for questions asked under examination conditions. The questions are in National Board format and center around a clinical problem that requires an anatomic answer.

As with previous editions, the book is heavily illustrated. Most figures have been kept simple in order to convey the fundamental floor plans that underlie the organization of body regions. Illustrations summarizing the nerve and blood supply of regions have been retained, as have overviews of the distribution of cranial nerves.

L.E.W.

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1 Introduction

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A 65-year-old man was admitted to the emergency department complaining of the sudden onset of a severe crushing pain over the front of his chest spreading down his left arm and up into his neck and jaw. On questioning, he said that he had had several attacks of pain before and that they had always occurred when he was climbing stairs or digging in the garden. Previously, he found that the discomfort disappeared with rest after about 5 minutes. However, on this occasion, the pain was more severe and had occurred spontaneously while he was sitting in a chair. Additionally, the pain had not abated.

The initial episodes of pain were angina, a form of cardiac pain that occurs on exertion and disappears on rest. Insufficient blood flow to the cardiac muscle from narrowing of the coronary arteries causes the angina. The patient has now experienced myocardial infarction, in which the coronary blood flow is suddenly reduced or stopped, and the cardiac muscle degenerates or dies. Because myocardial infarction is the major cause of death in industrialized nations, knowledge of the blood supply to the heart and the arrangement of the coronary arteries is of paramount importance in making the diagnosis and treating this patient.

CHAPTER OUTLINE

General Orientation
- Anatomic Terminology

Basic Anatomy
- Skin
- Fascia
- Bone
- Cartilage
- Joints
- Ligaments
- Bursae and Synovial Sheaths
- Muscle
- Nervous System
- Blood Vessels
- Lymphatic System
- Mucous and Serous Membranes
- Effects of Sex, Age, and Race on Structure

Medical Imaging
- Conventional Radiography (X-Rays)
- Computed Tomography
- Magnetic Resonance Imaging
- Ultrasonography
- Nuclear Medicine Imaging

LEARNING OBJECTIVES

The purpose of this chapter is to introduce the primary terminology used in describing the position and movement of the human body, some of the basic structures that compose the body (e.g., skin, fascia, muscles, bones), and the principles of medical imaging.

1. Define the anatomical position, the major planes of section, and the primary terms of direction used in anatomic descriptions.
2. Define the primary movements utilized in anatomic descriptions.
3. Identify the components of the skin and its appendages.
4. Identify the types and distributions of the fasciae of the body.