An Introduction to Anatomy

CHAPTER

1

Introduction

Anatomy is the study of external and internal structures and the physical relationships between body parts. Any time we identify our friends and family by specific anatomical features or respond to someone’s body language, we are acting as anatomists. Anatomical information provides clues about probable functions. Physiology is the study of function,
and all specific physiological functions are performed by specific anatomical structures. Microscopic anatomy considers structures that cannot be seen without magnification, whereas gross (macroscopic) anatomy considers structures and features visible to the naked eye.

Chapter 1 is an important foundation for further understanding of the details of anatomy. Learning the general structure of the body will lead to a more complete comprehension of individual structures. The most challenging part of this introductory chapter is for the student to not become overwhelmed by the terminology . . . the terms seem like a foreign language to many. Thus, it is important to establish the significance of anatomical terminology early in the course. Students need to understand that they can be successful in anatomy only if they master the terminology. The information regarding directional terms, position of body parts, body regions, and planes of section is very important for the students to learn and understand. This will make further studies much easier for them to assimilate and understand.

Chapter Learning Outcomes

 1. Define the limits of microscopic anatomy and compare and contrast cytology and histology. p. 2

 2. Compare and contrast the various ways to approach gross anatomy. p. 2

 3. Define the various subspecialties of anatomy. p. 2

 4. Explain the major levels of organization in a living organism. p. 5

 5. Identify the organ systems of the human body and compare and contrast their
functions. p. 7

 6. Understand and correctly apply descriptive anatomical and directional terminology. p. 14

Teaching Strategies

1. Lecture Ideas

a. The first day of class is the best time to get students excited about the human body. However, many are taking the course because it’s a requirement; so breaking through the barriers is not always easy.

b. A good way to start is to demonstrate to the students that they already know quite a few structures of the human body.

• Many students work out at a gym and know several of the muscle groups of
the body: abdominal (abs), biceps of arm, quads, hamstrings, deltoid, rotator cuff, etc. They may not know the individual muscles but using their existing awareness can really augment the learning experience in anatomy.

• Point out that they are also familiar with many of the structures of the digestive tract.

• They often think they know “everything” about the reproductive system. Even though they don’t, this “knowledge” can be used to ease their stress levels when beginning this class.

c. Have students create a glossary. This glossary should include prefixes, suffixes, and root words, so they can review them for studying or quick reference. During lecture, clearly indicate which words, roots, prefixes, and suffixes should be added to the students’ glossaries. Remind them that there is a glossary of terms at the end of the textbook. This glossary can be quite useful when the student is developing her/his glossary.

d. Write a few seemingly complex words on the board. For example, try sternocleidomastoid. Then break the word down into its simpler components: sternum, clavicle (cleido), and mastoid process. Then explain that from this we know the muscle has two origins (sternum and clavicle) and an insertion on the mastoid process of the temporal bone.

e. Tell students they must reinforce their learning with as much sensory input as possible. They must not only read about structures and look at the diagrams, but they also must:

• Say it out loud!

• Write it down!

• Draw and label it!

Speaking the words, writing the words, and drawing the structures will dramatically reinforce information covered in lab and lecture. Teaching the material to someone else ensures the highest retention rate of any study method, especially when used in conjunction with “say it, write it, and draw it.” Suggest that students teach their children, spouses, parents, and anyone else who will listen.

They also need to be encouraged to find as many external anatomical features as possible on their own bodies, as well as some internal structures that can be palpated. Note: Obviously, at this point, students will not know much about what they’re feeling. When we get to Chapter 12, Surface Anatomy and Cross-Sectional Anatomy, we can enhance their knowledge and deal with palpation points more thoroughly.

f. Every chance you get, it is best to relate the anatomy topic to something that students see/hear and are immediately concerned about. Simple things such as, when explaining the anatomical quadrants, relating appendicitis, gallstones, stomachache, menstrual cramps, etc., to each quadrant makes this topic more realistic.

In human anatomy, no matter what position the body is in, for descriptive purposes the body is always imagined to be in the anatomical position: standing erect, arms by sides, palms facing forward. In this position directions are given by superior, inferior, anterior, and posterior. These are equivalent to the zoologist’s cephalad, caudal, ventral, and dorsal. Thus, the eyes are always superior to the mouth, even if the patient is lying down or standing on his head. These terms are not quite equivalent to above, below, in front of, and behind. Therefore, to a layperson, an acrobat’s feet are above her head when she is dangling from a trapeze; to an anatomist they are inferior.

Students often have a problem understanding directional terms related to the surfaces on the hands and feet: the palms of the hands resemble the soles of the feet and the thumb is equivalent to the great toe. But the palmar surface of the hand faces anteriorly and the back is dorsal. In the foot we seem to defy logic and call the inferior surface plantar (equivalent to palmar) and the superior surface *dorsal*, even though it faces upward/anterior. To make these terms even more fun, point out that the great toe is medial but the thumb is lateral.

To help make the anatomical position “stick” in their minds, stand in the position and ask how it differs from the usual standing position. Students will quickly see that there are just a few differences to remember.

g. Point out to your students Figures 1.11, 1.12, and 1.13b and the Clinical Note on pages 20–21. Draw their attention to the concept of how the body looks different depending on the plane of section as well as the direction from which the body is viewed. Try cutting a cucumber in a variety of ways: transverse, midsagittal, sagittal, and some oblique sections. This can be effective with many students. Also present various images (x-ray, MRI, CT, etc.) to your class that represent differing ways of viewing the body (cross section—superior view; cross section—inferior view; midsagittal section; etc.) and have them discuss ways that may be utilized in order to determine the manner in which the body was sectioned and how it is being viewed.

h. Use the PowerPoint slides of Figure 1.6 to show the systems of the body. This figure reinforces that the students have knowledge of many of the organs and systems of the human body.

 2. Lab Ideas

a. To help students practice, practice, practice, and to motivate them to prepare for class, offer bonus points for the following activity. During class, ask individual students to describe parts of the human body, using two relative anatomical directional terms.
You can select two or let them select two of their own. Additional terms can be added to those that the text offers such as ipsilateral (on the same side), and contralateral
(on opposite sides), and others that are tailored to your teaching approach.

b. A good lab activity for helping students learn directional terminology involves students pairing up with a partner, selecting two structures, and describing the anatomical position relative to one another. Have the students either draw and label their selections or verbally report their selections to the class to ensure that they understand the terminology.

c. Have students perform the demonstration.

 3. Analogies

a. By learning the following, students can become equipped to survive the semester admirably:

• Key root words and prefixes and suffixes

• Anatomical planes

• Directional terms (e.g., proximal)

• Bony landmarks (e.g., spines that don’t look very “spiny”)

b. Show PowerPoint slides of a variety of sections through the human body. It is easier for students to understand sagittal, coronal, parasagittal, etc., if they see the body sections. (Some good ones are shown in textbook Figures 24.1, 24.4b, 24.5, 24.10a, 25.4, 25.5a, and 25.15.)

c. Students have some difficulty with the idea of membranes (combinations of connective tissues and epithelial tissues), whether it be of double-layered linings of internal body cavities (peritoneum) or those surrounding the lungs (pleura) or heart (pericardium).
It is helpful to distinguish between those membranes that are exposed to the external environment (lined with mucous membrane) and those that are “hermetically” sealed such as those surrounding the heart and lungs. To demonstrate how a single serous membrane can become two layers, with a cavity between them, blow up a balloon
and make a fist and push it into the side of the balloon until it is pretty much contained within the plastic. When students look through the balloon, they can see the outer membrane, which is the equivalent of the parietal membrane, and the inner one touching the fist, which is the visceral membrane. If you tell them that their hearts
are about the size and shape of their fists, they can equate this balloon with their pericardial membrane and see how the lining of the cavity differs from the lining
on the heart but is continuous. For the pericardium, refer to Figure 21.2 in the text.
Ask students what is in the space between the two layers of the balloon. With some coaching, they usually figure out it has to be a lubricant that prevents friction, provides shock absorption and temperature regulation, and maintains the integrity of the membranes. Also, have students put two wet microscope slides together (lengthwise). Demonstrate how the slides will easily “slip” against one another but are difficult to pull apart. This is a good visual for explaining the “potential space” between the two layers of serosa. Point out that the pericardium and pleura are good examples of this.

Note that cutaneous membrane refers to the skin.

d. When discussing the nine abdominopelvic regions, use the PowerPoint slide for Figures 1.9b and 1.9c. Because the umbilical region should be the most familiar to the students, start with it and mark an “X” on that region. As you move from one region to another, arbitrarily mark either an “X” or “O” on each of them. Students will quickly see that you’ve made a tic-tac-toe. Makes it more fun.

e. Anatomical terms related to the limbs are often confusing to students. The anatomist calls these the upper and lower limbs, and arm (brachial) means between shoulder and elbow, forearm (antebrachial) is between elbow and wrist, thigh (femoral) is between hip and knee, and leg (crural) is between knee and ankle.

 4. Common Student Misconceptions/Problems

a. The single greatest problem confronting students in an anatomy course is the sheer amount of information that even the most basic anatomy course requires. The material covered is not difficult, but there is a HUGE body of terms and facts that students must learn. At times it will seem like you're learning a foreign language. But, tell them not to panic. Stress that, if they're having difficulty, get help early. Don’t wait until they are hopelessly behind.

b. Point out early that many anatomical terms have been changed or are changing.
This is due to an effort to get rid of eponyms and replace them with anatomical terms. Pick a few terms that most students are familiar with and show them the changes. For example, Fallopian tubes are now called uterine tubes, and Eustachian tubes are now called auditory tubes.

c. Health care professionals often continue to use the eponyms in medical, nursing, dental, physical therapy, occupational therapy, etc., schools. Thus, whenever possible show the students these other terms. Many of them appreciate knowing the terminology they will be using in professional school.

 5. Vocabulary Aids

a. Frontal Section: Also called coronal section. Coronal can be associated with the coronation of a king.

b. Dorsal/Ventral: Where is the dorsal fin located on a fish? On its back.

c. Anterior/Posterior: Ante up before a poker game; write a postscript after a letter is signed. So as you or any creature moves forward, the anterior leads and the posterior follows. In humans, these terms divide a person into a front and a back. But in a quadruped, such as a cat or a pig, which you may dissect later, the dorsal/ventral divides the body into a top and a bottom and the anterior/posterior into a front and a back.

d. Medial: Same word root as medium or middle. In anatomy medial means toward the midline of the body or a body part.

e. Transverse: Think transcontinental railroad or transcontinental flight, meaning “across.”

f. Para-: Think paramedic or paralegal (at the side of the professional), so para means “at the side of” as in parasagittal.

g. Superior: Think of your superior at work or superior officer in the military; they are above you.

h. Thoracic: Students may have studied insects in school and learned that they have a head, a thorax, and an abdomen. The position of our thorax is similar, between our head and abdomen (belly).

i. Pericardium: Wraps around (peri) the heart (cardia) similar to a perimeter fence around a property.