EXERCISE

2 Introduction to the Human Body

Master List of Materials

- Variety of objects and object sets, each representing a level of organization
- Anatomical models, sectioned
- Torso models with internal organs
- Anatomical charts
- Articulated skeleton
- Objects for sectioning

Time Requirement

- Students need approximately 15–20 minutes per laboratory activity.
- Give students time to get familiar with how to work in the laboratory.
- Pairing up students as lab partners helps them get to know one another and encourages participation.

Laboratory Preparation

1. Because this is the first laboratory class for most students, be sure to lay out the material in an organized, easy-to-follow pattern. Consider using signs to identify the set of materials for use in each laboratory activity.
2. Remember to include the removable organs with each anatomical model.

Teaching Tips and Students' Misconceptions

Introduction

- Emphasize that complexity increases from the chemical to organism levels. Students might mistakenly assume that the chemical level of organization is the most complex because they consider chemistry courses difficult! Ask them, "Which has more structures and functions—an individual cell or the entire body?"
- Have students remove all organs from the torso model as they are identified. Returning each organ to its correct location reinforces the relational position among organs.

Lab Activity 1—Organization of the Body

- Emphasize that complexity increases from chemical to organism levels. Students might mistakenly assume that the chemical level of organization is the most complex because they consider chemistry courses difficult! Ask them, "Which has more structures and functions, an individual cell or the entire body?"
- Use a variety of anatomical models to represent the levels of organization.

Lab Activity 2—Anatomical Position and Directional Terminology

- Use the relationship of the elbow to the shoulder to demonstrate the importance of anatomical position. Move your arm to different positions, such as raised, held straight out in front, and out to the side, and explain how the anatomical relationship changes each time (i.e., arm raised and elbow is "superior" to shoulder). Also, ask students to determine if the lab models are in anatomical position.
- Place letters or numbers on different regions of a torso model and ask students to compare each labeled region with the others. Encourage students to study the terms in natural pairs such as "superior and inferior" and "lateral and medial."

Lab Activity 3—Regional Terminology

- This is a good section to discuss the importance of learning prefixes and suffixes while studying anatomy and physiology.

Lab Activity 4—Planes and Sections

- Remind students that a plane is an imaginary line while a section is the actual cut on the body.

Lab Activity 5—Body Cavities

- Use the open space of a roll of masking tape to demonstrate the vertebral foramen of a vertebra. Next, stack several rolls of tape on your hand to simulate the vertebral canal.
- Compare the heart and pericardium to an apple in a sack. The sack is the parietal pericardium, the apple's skin is the visceral pericardium, and the space in the sack is the pericardial cavity.
- On many torso models, the serous membranes are represented as a painted surface. Remind students to use a variety of laboratory models for each activity.
- Use thin plastic bags as serous membranes and allow students to place the organs into the torso model.

Exercise 2: Answers to Questions

QuickCheck

1.1 The lowest living level of organization in the body is the chemical (molecular) level.

1.2 Homeostasis is the maintenance of a relative steady internal environment.

2.1 Anatomical position places the body in a reference position to standardize the location and descriptions of structures.

2.2 The shoulder joint is proximal to the elbow joint.

2.3 Muscles are deep to the skin.

3.1 The upper limb includes the arm, which is the brachium; the elbow is the antecubitis; and the forearm is the antebrachium.

3.2 The torso is divided into nine abdominopelvic regions by two lateral planes just medial to the nipples and two horizontal planes; the transpyloric plane is superior to the umbilicus and the transtubercular plane across the hips.

4.1 A frontal section would separate the kneecap (patella) from the lower limb.

4.2 A transverse section is used to amputate a limb.

5.1 The cranial bones of the skull curve and interlock to form the cranial cavity. The spinal cavity is a narrow canal of the vertebral column fashioned by the articulating vertebrae.

5.2 The ventral body cavity is subdivided into the thoracic and abdominopelvic cavities. The thoracic cavity houses the two pleural cavities, the pericardial cavity, and the mediastinum. The abdominopelvic cavity includes the abdominal cavity and the pelvic cavity.

5.3 Serous membranes have two layers: an outer parietal layer located against the wall of the body cavity and an inner visceral layer attached to the surface of the organ.

5.4 The three serous membranes of the body are the pleura of each lung, the pericardium of the heart, and the peritoneum of the abdomen.

Review & Practice Sheet

A. Definitions

1. Anterior: the front, before

2. Lateral: away from the body's longitudinal axis

3. Proximal: toward a point of attachment

4. Ventral: the belly side, same as anterior in reference to humans

5. Posterior: the back, behind

6. Medial: toward the body's longitudinal axis

7. Distal: away a point of attachment

8. Superficial: at or near the surface

9. Superior: above or at a higher level

10. Dorsal: the back, same as posterior in humans

11. Inferior: below, at a lower level

12. Deep: away from the body's surface

B. Fill in the Blanks

1. pericardial cavity, thoracic cavity
2. peritoneal
3. retroperitoneal, peritoneal cavity
4. visceral pleura
5. cranial cavity
6. serous fluid
7. mediastinum
8. diaphragm
9. parietal
10. anterior
11. lateral
12. superior
13. proximal
14. posterior
15. superior

C. Short-Answer Questions

1. The six main levels of organization in the body are:
- Chemical: lowest level, includes atoms and molecules
- Cellular: basic living level
- Tissue: group of similar cells with similar functions
- Organ: group of tissues working together, has definite shape
- Organ system: groups of organs working to accomplish specific function
- Organism: entire individual

2. The location of the nine abdominopelvic regions are:
- Right and left hypochondriac regions: under the ribs
- Epigastric region: between hypochondriac regions
- Right and left lumbar regions: sides of trunk above hips
- Umbilical region: between lumbar regions, surrounds navel
- Right and left inguinal regions: lower trunk at the hips
- Hypogastric (pubic) region: between the inguinal regions

3. Anatomy is the structure of the body and the study of relationships among structures. Physiology is the function of structures, the work necessary to maintain homeostasis.
4. Homeostasis refers to the relatively constant internal environment of the body.
5. The liver is located in the upper right quadrant.
6. The urinary bladder is in the hypogastric (pubic) region.
7. A parasagittal section is an unequal division of right and left sides.
8. The brachium, antecubitis, and antebrachium constitute the upper limb. (Remember that the arm is the brachium only.)
9. The dorsal surface of four-legged animals is the side located opposite of the belly—the back.

D. Labeling

FIGURE 2.7

1. cranial
2. axillary
3. brachial
4. antecubital
5. antebrachial
6. carpal
7. palmar
8. digits (phalanges)
9. patellar
10. crural
11. tarsus
12. digits (phalanges)

13. cervical
14. thoracic
15. mammary
16. abdomenal
17. umbilical
18. pelvic
19. trunk
20. manual
21. inguenal
22. pubic
23. femoral
24. pedal

FIGURE 2.8

1. superior
2. lateral
3. medial
4. proximal
5. distal
6. inferior
7. cephalic
8. posterior
9. anterior
10. caudal

FIGURE 2.9

1. cranium
2. spinal cavity
3. thoracic cavity
4. diaphragm
5. abdominal cavity
6. pelvic cavity
7. abdominopelvic cavity
8. pericardial cavity
9. visceral pericardium
10. parietal pericardium

E. Drawing

1. Answers may vary.
2. Answers may vary.

F. Analysis and Application

1. The body can move in different planes and it is therefore important to always use anatomical position while describing anatomy. For example, if the upper limb is raised, the antecubitis is positioned superior to the brachium, but the correct anatomical association is the antecubitis is inferior to the brachium.
2. In humans, the abdominal surface is anterior and the back is posterior. In four-legged animals, inferior or ventral refers to the belly and superior or dorsal refers to the back.
3. The brain is protected by bones of the skull that form the walls of the cranial cavity. A large hole at the base of the skull connects the brain with the spinal cord. The vertebrae stacked into a column create a narrow tube, the spinal cavity, which encases the spinal cord.
4. Organs surrounded by serous membranes have reduced friction on their surfaces because of the lubricating quality of the serous fluid between the double-layered membrane. A serous membrane also isolates an organ from surrounding structures and helps to prevent the spread of infection.

G. Clinical Challenge

1. The pleural cavity contains serous fluid that reduces friction between the lung and the thoracic wall. With dry pleurisy, a thick secretion covers the pleura and respiration becomes painful. Irritation of the pleura may also cause coughing.
2. The patient Doug presents abrasions (scrapes) on both patellar regions and on the left pelvic and olecranal regions.