THE HUMAN BODY

Preview:

Goals and Objectives:

As allied health professionals we do not need enough medical knowledge to diagnose or treat health problems, but we do need to understand how the body functions. We need to understand the functions of the body well enough to be able to intelligently discuss issues with other health care workers as well as keep accurate charts and patient records.

When you complete this study unit you will be able to:

- Describe the basic structures of the human body and describe what their function
- Identify anatomical positions and directional terms
- Identify the three planes, four quadrants, and nine regions of the body
- List five major body cavities

Contents:

INTRODUCTION:

The study of body structures and their organization is called *anatomy*. The Greek translation of the term is "a cutting up". In decades past, scientists would literally cut up or dissect the body to learn about its various parts.

The study of the processes and the functions of the body is called *physiology.* You will usually find that anatomy is discussed hand in hand with physiology, since they are so closely related. They are so commonly found together that they have their own abbreviation of—A & P. Just remember it like this: anatomy is the study of all of the body's parts and how they fit together, while physiology is the study of what all of the body's parts do, and how they work together.

The material covered in this study unit will be *gross anatomy.* You will find below a listing of the different subdivisions of anatomy and physiology.

SUBDIVISIONS of <u>ANATOMY</u>	**DESCRIPTION**
Surface Anatomy	Study of the form and markings of the surface of the body.
Gross Anatomy	Study of the structures that can be examined without using a microscope
Systemic Anatomy	Study of specific systems of the body such as the nervous system or respiratory system.
Regional Anatomy	Study of a specific region of the body such as the head or chest.
Radiographic Anatomy	Study of the structure of the body that includes the use of x-rays.
Developmental Anatomy	Study of development from the fertilized egg to adult form.

SUBDIVISIONS of <u>PHYSIOLOGY</u>	**DESCRIPTION**
Cell Physiology	Study of the functions of cells.
Pathophysiology	Study of functional changes associated with disease and aging.
Exercise Physiology	Study of changes in cell and organ functions during muscular activity.
Neurophysiology	Study of functional characteristics of nerve cells.
Endocrinology	Study of hormones and how they control body functions.
Cardiovascular Physiology	Study of functions of the heart and blood vessels.
Immunology	Study of body defense mechanisms.
Respiratory Physiology	Study of functions of the air passageways and lungs
Renal Physiology	Study of the functions of the kidneys.

STRUCTURES OF THE BODY:

The human body is made up of many 'levels' of small, medium, and large parts that are all associated with one another and work together as a whole. Those levels of organization are referred to as chemical, cellular, tissue, organ, system, and organism. The smallest structure of the body is the cell. Cells make up tissues, tissues combine to make organs, and groups of organs become systems.

The four types of tissues are listed below.

TISSUES	**FUNCTIONS**
Epithelial Tissue	Forms the lining of internal organs, makes up endocrine and exocrine glands, & forms the outer surface of the skin covering the body. This tissue functions to protect the body and to absorb, secrete, and excrete substances.
Muscle Tissue	*Voluntary* (striated) muscle is found in arms and legs and parts of the body where movement is voluntary. *Involuntary* (smooth) muscle is found in the heart and digestive system, and in other places where movement is not under conscious control. *Cardiac* (smooth) muscle is a specialized type of muscle found only in the heart.
Connective Tissue	Connects or supports other body structures. *Fat* (adipose tissue) *Cartilage* (elastic, fibrous tissue attached to bones) *Bone* *Blood* *Scar tissue* *Fascia* forms a membrane around muscles and organs to separate and support them.
Nerve Tissue	Conducts impulses all over the body; carries messages to and from the brain.

ORGANS

Organs are structures that are composed of several kinds of tissue to perform a certain function for the body. All organs make use of epithelial, muscle, connective and nerve tissues. Take the organ of the stomach for example. The term for the internal organs is *viscera*. Examples of abdominal viscera are the liver, stomach, intestines, pancreas, spleen, and gallbladder.

Most organs are located in spaces called cavities. There are five (5) major body cavities listed below, with a few examples of the organs that each contain. The thoracic cavity contains two more cavities within it.

BODY CAVITY	**ORGANS FOUND IN CAVITY**
1. Cranial—space enclosed by skull	*Brain, Pituitary Gland*
2. Spinal—space within the backbones	*Nerves of the spinal cord*
3. Thoracic—space between the neck & diaphragm.	*Lungs*
a. **Mediastinum**	*Heart, esophagus, trachea, bronchial tubes*
b. **Pericardial**	*Heart*
4. Abdominal—space between the diaphragm & hip bones	*Stomach, spleen, liver, gallbladder, pancreas, small & large intestines*
5. Pelvic—space within the walls of the pelvis, below the hip bones	*Urinary, reproductive organs*

PRACTICE TEST (1)

1. Name the 4 types of tissue.

   _____

   _____

   _____

   _____

2. Name the cavity which houses the major organs of the respiratory system.

   _____

3. Name the cavity which houses the major organs of the reproductive system.

   _____

4. Name the cavity which houses the heart _____

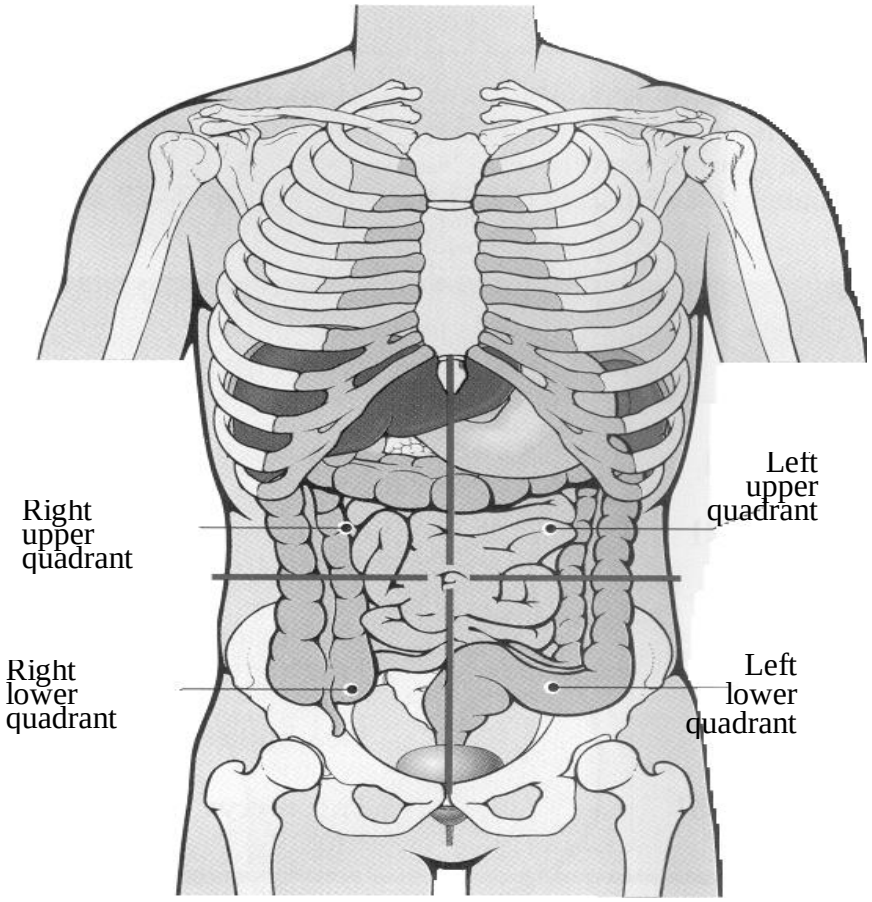

Figure 1

Four quadrants of the Abdominopelvic Cavity

A muscular wall called the *diaphragm* separates the thoracic and abdominal cavities. Since there is nothing present to separate the abdominal and pelvic cavities, they are many times combined to form the *abdominopelvic cavity.* The abdominopelvic cavity is divided into four (4) quadrants. Imaginary horizontal and vertical lines are passed through the *umbilicus* or navel. **Figure 1** illustrates these four quadrants.

Right Upper Quadrant (RUQ) contains the liver (right lobe), gallbladder, part of the pancreas, and parts of the small and large intestine.

Left Upper Quadrant (LUQ) contains the liver (left lobe), stomach, spleen, part of the pancreas, and parts of the small and large intestine.

Right Lower Quadrant (RLQ) contains parts of the small and large intestines, right ovary, right fallopian tube, and right ureter.

Left Lower Quadrant (LLQ) contains parts of the small and large intestines, left ovary, left fallopian tube, and left ureter.

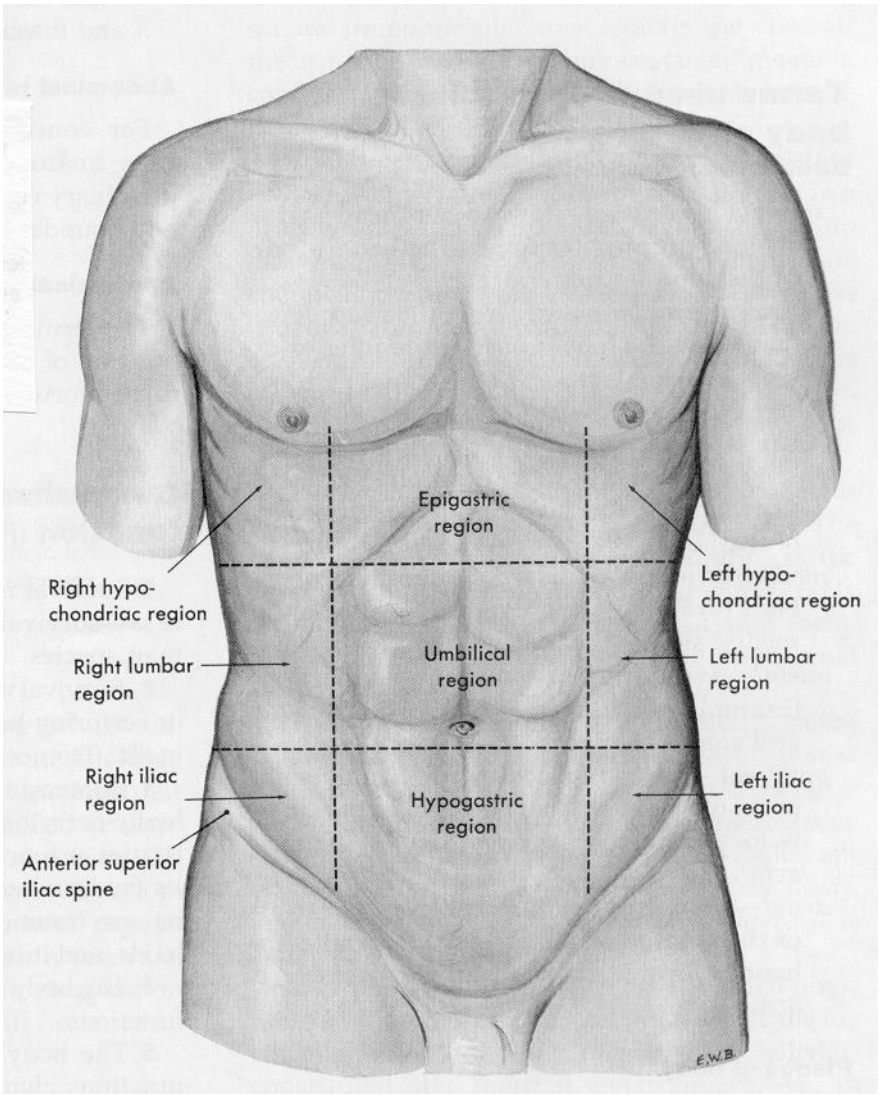

Figure 2
Abdominopelvic Regions

ABDOMINOPELVIC REGIONS:

Hypochondriac	Upper right & left regions beneath the ribs.
Epigastric	Upper middle region above the stomach.
Lumbar	Middle right & left regions near the waist.
Umbilical	Central region near the navel.
Inguinal	Lower right & left regions near the groin. Also called the *iliac regions*.
Hypogastric	Lower middle region below the umbilical region.

Locational Terms:

Locational terms will prove to be very useful as you expand your relationships with others in the health care industry, so you need to be familiar with them. You have just learned the abdominopelvic quadrants and regions, and now you for the planes of the body. A plane is an imaginary flat surface. **Figure 2** illustrates where these planes are located, and shows how they are used.

The following are the 4 planes that we will focus on in this home study unit.

PLANES OF THE BODY:

Sagittal	A lengthwise plane running from front to back; it divides the body *or any of its parts* into right and left sides.
Median	Sagittal plane *through the midline*; divides the body or any of its parts into right and left halves.
Coronal or **Frontal**	A lengthwise plane running from side to side; divides the body or any of its parts into anterior and posterior portions (front & back).
Transverse or **Horizontal**	A crosswise plane; divides the body or any of its parts into upper and lower parts.

The term *anatomical position* means an erect position of the body, with arms at sides, palms turned forward. (supinated)

DIRECTIONAL TERMS:

Superior or Cranial	Toward the head end of the body; upper; above
Inferior or Caudal	Away from the head; lower; below another structure
Anterior or Ventral	Front (belly side)
Posterior or Dorsal	Back
Medial or Mesial	Toward the midline of the body; pertaining to the middle
Lateral	Away from the midline of the body; pertaining to the side
Proximal	Toward or nearest the trunk or point of origin of a part
Distal	Away from or farthest from the trunk or point of origin
Prone	Lying on the belly (face down, palm down)
Supine	Lying on the back (face up, palm up)

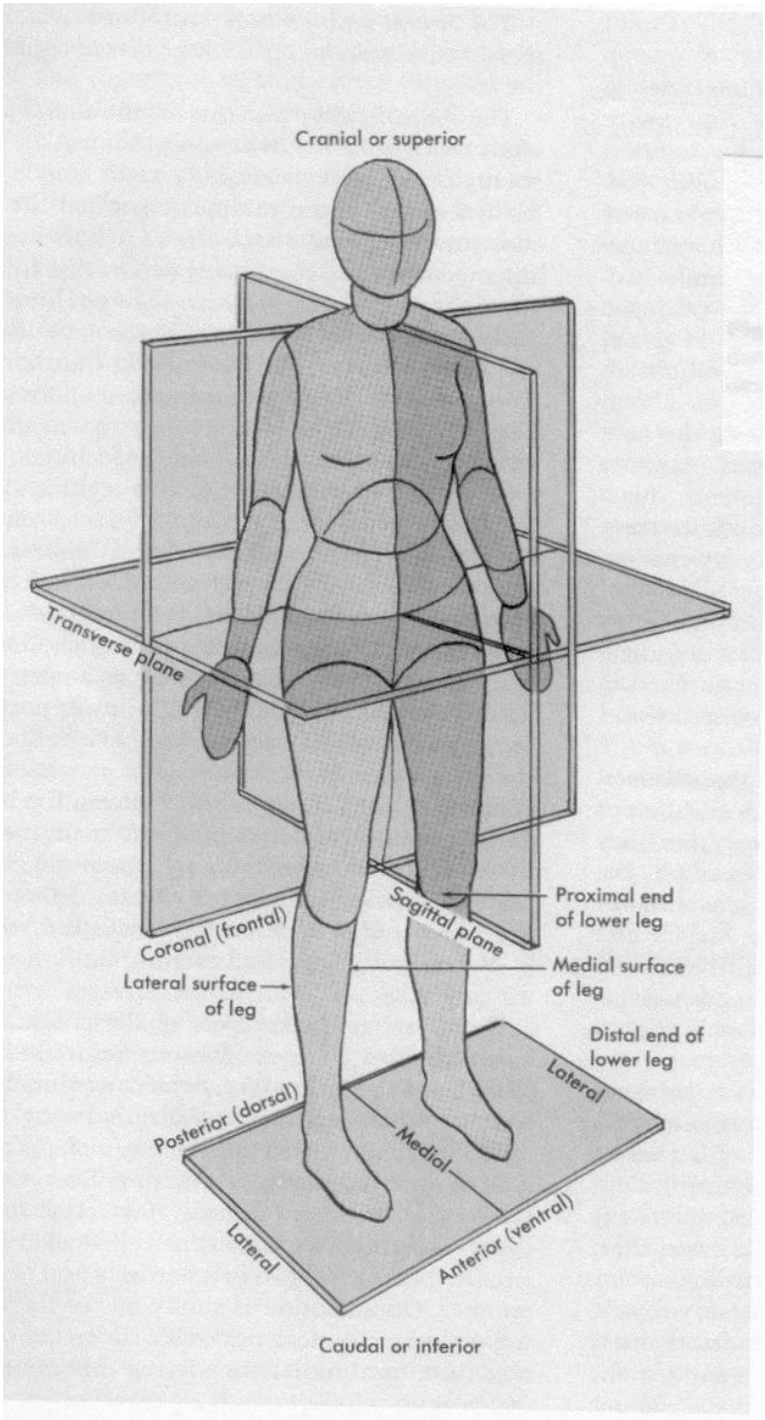

Figure 3

Planes of the Body

PRACTICE TEST (2)

Circle the correct answer.

1. A sagittal plane divides the body (vertically, horizontally).
2. A frontal plane divides the body into (anterior & posterior/ superior & inferior) sections.
3. The plane that divides your body into upper and lower halves is the (transverse/vertical) plane.
4. Lying on your belly is the (prone/supine) position.
5. The kneecap is located on the (anterior/posterior) side of the leg.
6. Your big toe is located on the (medial/lateral) side of your foot.
7. Your stomach is (inferior/superior) to your lungs.
8. Your hand is located at the (proximal/distal) end of your forearm.
9. Your knee is located at the (proximal/distal) end of your *lower* leg.
10. Your heart is (superior/anterior) to your liver.

PRACTICE TEST (3)

Name the five cavities of the body.

1. The cavity surrounded by the skull _____
2. The cavity in the chest surrounded by the ribs _____
3. The cavity below the chest, and contains the liver and stomach _____
4. The cavity surrounded by the hip bone _____
5. The cavity surrounded by the bones of the neck _____

SYSTEMS OF THE BODY

Systems of the body consist of several related organs that have a common function. A system is an organization of varying numbers and kinds of organs arranged together so they can perform complex functions for the body. For example, the organs of digestion which break down and digest food include the mouth, esophagus, and intestines. Then other factors come into play when the salivary glands, liver, and pancreas become involved. So there are exceptions to the rules. Some organs are part of more than one system.

System	Organs
Digestive	mouth, throat, esophagus, stomach, intestines (large and small), liver, gallbladder, pancreas
Urinary or Excretory	kidneys, ureters, urinary bladder, urethra
Respiratory	nose, pharynx (throat), larynx (voice box), trachea (wind pipe), bronchial tubes, lungs
Lymphatic	lymph, lymph vessels, including the spleen, thymus gland, lymph nodes, and tonsils
Reproductive	female: ovaries, fallopian tubes, uterus, vagina, mammary male: testes & associated tubes, urethra, penis, prostate
Endocrine	thyroid gland, pituitary gland, sex glands (ovaries & testes), adrenal glands, pancreas, parathyroid glands
Nervous	brain, spinal cord, nerves, and collections of nerves
Circulatory	heart, blood vessels, lymphatic vessels and nodes, spleen, thymus gland
Muscular	muscles
Skeletal	bones and joints
Integumentary	skin, hair, nails, sweat glands, sebaceous (oil) glands, eye, ear, nose, and tongue

Terms related to tissues, organs, and systems.

abdominal cavity	space between the diaphragm and hip bones; contains the major organs of digestion.
cardiac muscle tissue	specialized form of involuntary muscle tissue found only in the heart.
cavity	space or hollow within the body.
connective tissue	tissue specializing in connection and support of body parts.
cranial	space enclosed by the skull; houses the brain and pituitary gland.
diaphragm	muscular wall dividing thoracic and abdominal cavities.
epithelial	tissue that protects, lines, or invests body organs.
fascia	connective tissue membrane that invests body parts.
invest	cover or surround a part of the body.
involuntary muscle tissue	muscle tissues that are controlled automatically by the nervous system.
mediastinum	cavity between the thoracic cavity; contains the heart, esophagus, trachea, and bronchial tubes.
muscle	tissue specializing in movement of body parts; may be voluntary, involuntary, or cardiac.
nerve	tissue that carries nerve impulses.
pericardial	space within the Mediastinum that contains the heart.
peritoneum	membrane investing the abdominal cavity and viscera.
pleural	space between the lungs and the pleura.
spinal	space between the backbones; houses the nerves of the spinal cord.
striated	striped appearance of voluntary muscles.
thoracic cavity	space between the neck and diaphragm; houses the lungs.
viscus viscera (plural)	internal organ(s), particularly of the abdominal cavity.
voluntary or striated muscle tissue	muscle tissues that are controlled by a person's conscious effort.

Answers to Practice Test (1), page 7:

1. Epithelial, Muscle, Connective, Nerve
2. Thoracic
3. Pelvic
4. Thoracic **or** Mediastinum **or** Pericardial

Answers to Practice Test (2), page 12:

1. Vertically
2. Anterior/posterior
3. Transverse
4. Prone
5. Anterior
6. Medial
7. Inferior
8. Distal
9. Proximal
10. Superior

Answers to Practice Test (3), page 12:

1. Cranial
2. Thoracic
3. Abdominal
4. Pelvic
5. Spinal

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Tortora, Gerard J., & Grabowski, Sandra Reynolds. **Principles of Anatomy and Physiology**, 8th Edition. Harper Collin College Publishers, 1996

INSTRUCTIONS FOR SUBMITTING
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