

# Chapter 4

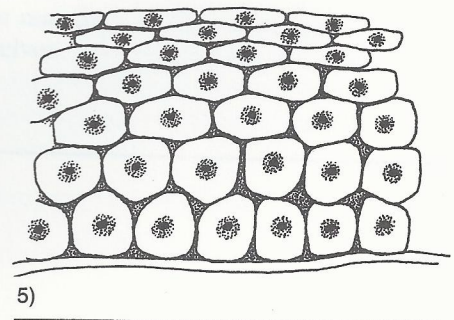
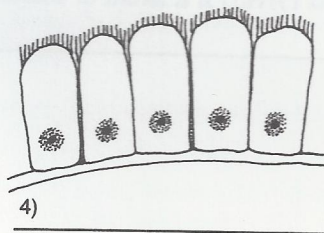
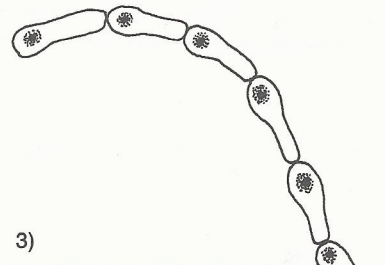
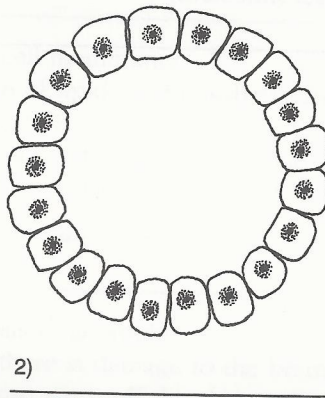
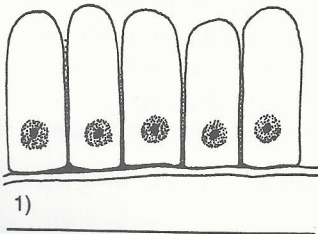
## Tissues and Membranes

This chapter describes the tissues, which are groups of cells with similar structure and functions. The four major groups of tissues are epithelial tissue, connective tissue, muscle tissue, and nerve tissue. Each of these groups has very specific characteristics and actions.

### EPITHELIAL TISSUE

1. The following diagrams depict some of the types of epithelial tissue.

*Label each type with its complete name.*



2. Match each epithelial tissue with its proper structure (one or two letter statements) and functions in the body (one or more number statements).

*Use each letter and number once. Each answer line will have one correct letter and may have more than one correct number.*

- 1) Simple squamous epithelium \_\_\_\_\_
- 2) Stratified squamous epithelium \_\_\_\_\_
- 3) Transitional epithelium \_\_\_\_\_
- 4) Cuboidal epithelium \_\_\_\_\_
- 5) Columnar epithelium \_\_\_\_\_
- 6) Ciliated epithelium \_\_\_\_\_

#### Structure

- A. Many layers of cells; surface cells are flat
- B. Columnar cells with cilia on their free surfaces
- C. One layer of cells that are taller than they are wide
- D. One layer of cube-shaped cells
- E. One layer of flat cells
- F. Many layers of cells; surface cells are alternately rounded or flat

#### Function

1. Forms the alveoli of the lungs and permits diffusion of gases
2. Secretes the hormones of the thyroid gland
3. Forms the epidermis of the skin
4. Forms the stomach lining and secretes gastric juice
5. Forms capillaries to permit exchanges of materials
6. Secretes the saliva of salivary glands
7. Permits stretching of the urinary bladder as it fills
8. Lines arteries and veins and is smooth to prevent abnormal blood clotting
9. Forms the lining of the mouth and the esophagus
10. Lines the trachea, and sweeps mucus and bacteria toward the pharynx
11. Forms the lining of the small intestine and absorbs nutrients
12. Lines the fallopian tubes to sweep an ovum toward the uterus
13. May have microvilli to increase the surface area for absorption

3. Glands are made of epithelial tissue, and there are several different categories. Match each type of gland with its proper structure (a letter statement) and an example in the body (a number statement).

*Use each letter and number once. One answer line will have two correct letters.*

- 1) Unicellular glands \_\_\_\_\_
- 2) Exocrine glands \_\_\_\_\_
- 3) Endocrine glands \_\_\_\_\_

#### Structure

- A. Consist of only one cell
- B. Have no ducts; their secretions enter capillaries
- C. Have ducts to take their secretions to their site of action
- D. Their secretions are called hormones

#### Example

1. The thyroid gland and pituitary gland
2. Goblet cells that secrete mucus
3. The salivary glands and sweat glands

**CONNECTIVE TISSUE**

1. Match each connective tissue with its proper structure (a letter statement) and functions in the body (one or more number statements).

*Use each letter and number once. Each answer line will have one correct letter and may have more than one correct number.*

- 1) Blood \_\_\_\_\_
- 2) Areolar connective tissue \_\_\_\_\_
- 3) Adipose tissue \_\_\_\_\_
- 4) Fibrous connective tissue \_\_\_\_\_
- 5) Elastic connective tissue \_\_\_\_\_
- 6) Bone \_\_\_\_\_
- 7) Cartilage \_\_\_\_\_

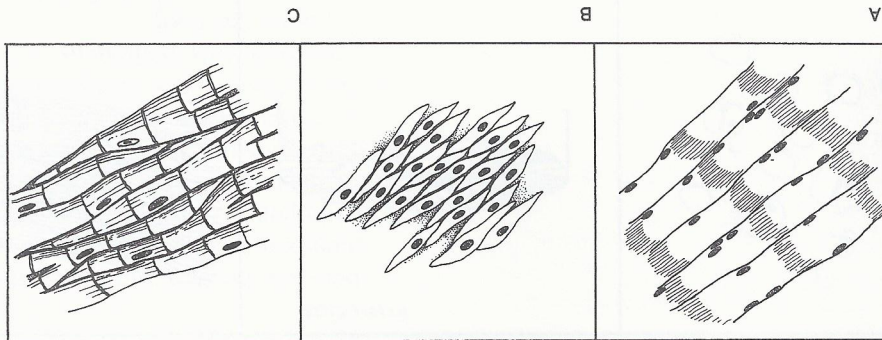
**Structure**

- A. Made primarily of elastin fibers
- B. Made of cells in the fluid matrix called plasma
- C. Made of osteocytes in a matrix of calcium salts and collagen
- D. Made of cells specialized to store fat
- E. Made of fibroblasts in a matrix of tissue fluid, collagen, and elastin fibers
- F. Made of chondrocytes in a matrix that is smooth and flexible
- G. Made primarily of collagen fibers

**Function**

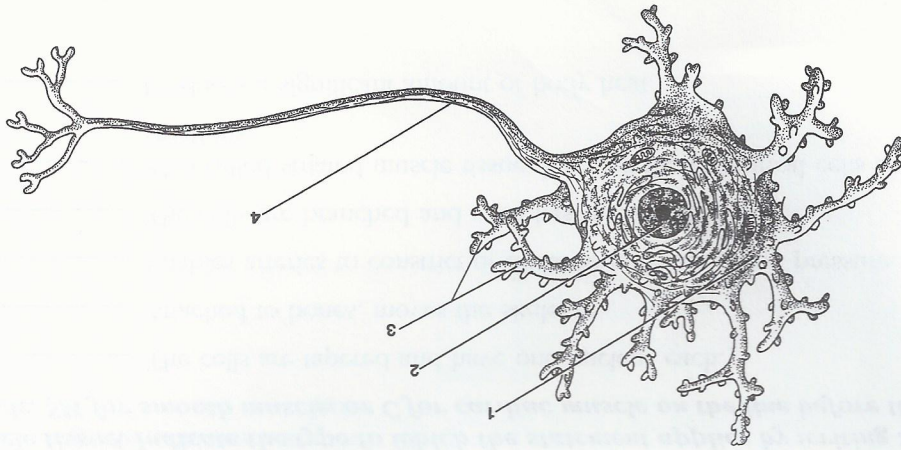
- 1. Beneath the skin and the epithelium of mucous membranes; has white blood cells to destroy pathogens
- 2. Forms tendons that connect muscles to bones
- 3. Surrounds the alveoli of the lungs and contributes to normal exhalation
- 4. Transports oxygen and nutrients and contains cells to destroy pathogens
- 5. Supports the body
- 6. Provides a smooth surface to prevent friction on joint surfaces
- 7. Stores excess energy in subcutaneous tissue
- 8. The cells are produced in red bone marrow
- 9. Forms ligaments that connect bone to bone
- 10. Forms rings to keep the trachea open
- 11. In the walls of the large arteries where it helps maintain blood pressure
- 12. Protects some internal organs from mechanical injury

- 7) \_\_\_\_\_ Forms the walls of the chambers of the heart; its function is to pump blood.
- 8) \_\_\_\_\_ Also called visceral muscle, because it is found in many internal organs.
- 9) \_\_\_\_\_ Produces involuntary waves of contraction, called peristalsis, in the intestines.
- 10) \_\_\_\_\_ Each cell has several nuclei.
- 11) \_\_\_\_\_ The cells contract by themselves; nerve impulses regulate only the rate of contraction.
- 12) \_\_\_\_\_ Also called voluntary muscle, because nerve impulses are required for contraction.
- 13) \_\_\_\_\_ In the iris of the eye, it will constrict or dilate the pupil.
- 14) \_\_\_\_\_ Has intercalated discs for rapid impulse transmission from cell to cell.
2. The following diagrams depict the three types of muscle tissue.



### NERVE TISSUE

1. The name for nerve cells is \_\_\_\_\_, and these cells are specialized to generate and transmit \_\_\_\_\_.
2. The following diagram depicts a neuron.



Label the following structures: cell body, nucleus, axon, dendrites.

3. a) The axon of a neuron carries impulses \_\_\_\_\_ (toward or away from) the cell body.  
 b) The dendrites of a neuron carry impulses \_\_\_\_\_ (toward or away from) the cell body.
4. a) In the peripheral nervous system, the specialized cells that form the myelin sheath are called \_\_\_\_\_.
- b) In the central nervous system, the specialized cells are called \_\_\_\_\_.
5. a) The space between the axon of one neuron and the dendrites or cell body of the next neuron is called the \_\_\_\_\_.
- b) Here, the transmission of nerve impulses depends upon chemicals called \_\_\_\_\_.
6. Name two organs made of nerve tissue. \_\_\_\_\_ and \_\_\_\_\_.
7. State two general functions of nerve tissue in these organs or the nervous system as a whole.  
 \_\_\_\_\_ and \_\_\_\_\_.

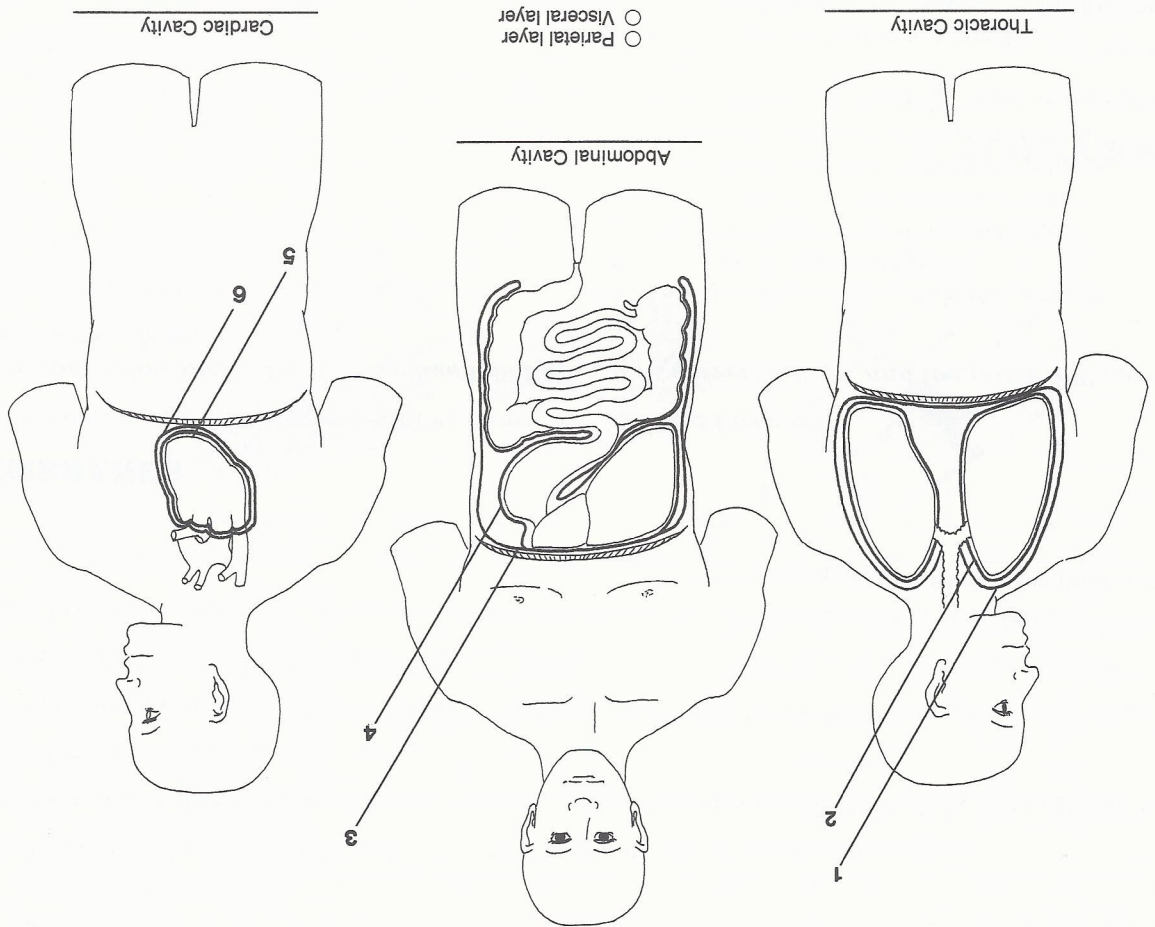
## MEMBRANES

1. Match each epithelial membrane with its proper locations and functions.

***Use each letter once. One answer line will have seven correct letters, and the other will have five correct letters.***

- |                           |   |
|---------------------------|---|
| 1) Serous membranes _____ | A. Line the respiratory and digestive tracts          |
| 2) Mucous membranes _____ | B. Line closed body cavities                          |
|                           | C. Made of simple squamous epithelium                 |
|                           | D. Cover organs in closed body cavities               |
|                           | E. Line the urinary and reproductive tracts           |
|                           | F. Secrete serous fluid to prevent friction           |
|                           | G. Secrete mucus to keep the living surface cells wet |
|                           | H. Include the pleural membranes                      |
|                           | I. Line body tracts that open to the environment      |
|                           | J. Include the peritoneum and mesentery               |
|                           | K. May contain goblet cells                           |
|                           | L. Include the pericardial membranes                  |

2. a) The serous membranes that are found in closed body cavities are shown in the following diagrams. Label both membranes in each pair, and then complete the statements using proper terminology.



b) The \_\_\_\_\_ pleura lines the chest cavity, and the \_\_\_\_\_ pleura covers the lungs.

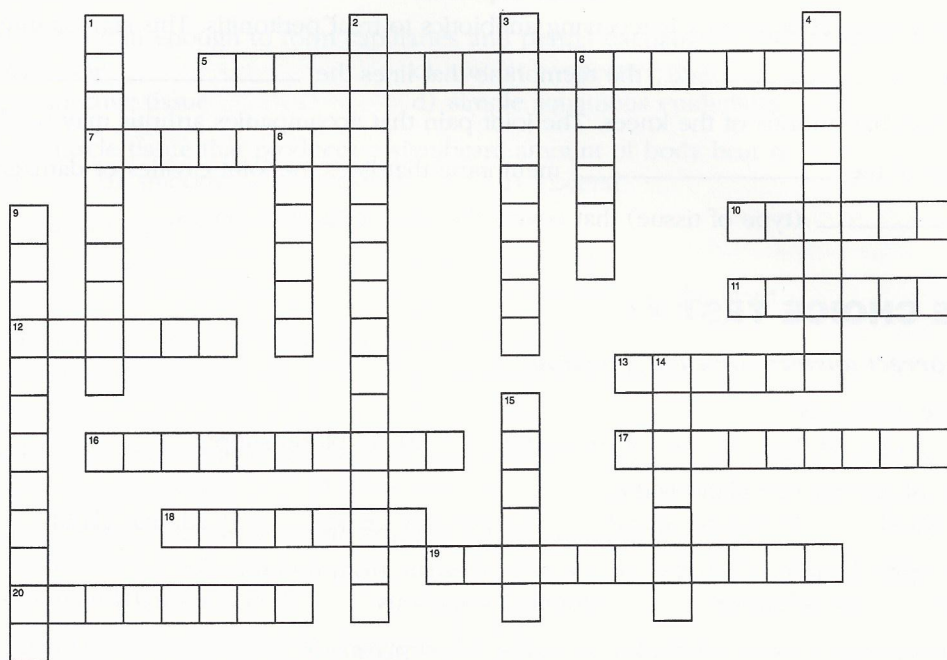
c) The \_\_\_\_\_ lines the abdominal cavity, and the \_\_\_\_\_ covers the abdominal organs.

d) The \_\_\_\_\_ pericardium lines the fibrous pericardium, and the \_\_\_\_\_ pericardium covers the heart muscle.

3. Match each connective tissue membrane with the statement that describes its location and function.

**Use each letter once.**

- |                              |   |
|------------------------------|---|
| 1) Superficial fascia _____  | A. Lines joint cavities and secretes fluid to prevent friction when joints move |
| 2) Deep fascia _____         | B. Forms a sac around the heart   |
| 3) Synovial membrane _____   | C. Covers cartilage and contains capillaries                                    |
| 4) Fibrous pericardium _____ | D. Covers the brain and spinal cord and contains cerebrospinal fluid            |
| 5) Perichondrium _____       | E. Covers bone and contains blood vessels that enter the bone                   |
| 6) Periosteum _____          | F. Between the skin and the muscles; contains adipose tissue                    |
| 7) Meninges _____            | G. Covers each skeletal muscle and anchors tendons                              |



### ACROSS

5. chemicals that transmit impulses at synapses
7. protein fibers that are very strong
10. membranes that line body tracts open to the environment
11. structural network of non-living intercellular material
12. nerve cell
13. membranes that line closed body cavities
16. tissue found on body surfaces
17. found on the joint surface of bones
18. small space between two neurons
19. blood-forming tissue
20. glands that have ducts

### DOWN

1. cardiac muscle
2. a tissue that contains matrix and cells (two words)
3. ductless glands
4. bone cells
6. the tissue capable of contraction
8. organs that produce secretions
9. cartilage cells
14. protein fibers that are elastic
15. matrix of blood

**CLINICAL APPLICATIONS**

1. A 9-year-old boy has a simple fracture of the humerus, the bone of the upper arm. This fracture will heal relatively rapidly because bone has a good \_\_\_\_\_ to transport nutrients and oxygen to the site of repair.
2. A 26-year-old football player has torn cartilage in his knee joint. Such damage will be repaired slowly or not at all because cartilage itself has no \_\_\_\_\_.
3. a) A victim of a diving accident has had his spinal cord severed in the lower cervical region, and no nerve impulses pass below this level. As a result, the \_\_\_\_\_ muscles below the neck are paralyzed because they no longer receive nerve impulses to initiate contraction.  
 b) However, the \_\_\_\_\_ continues to contract because cardiac muscle cells are able to contract without the stimulus of nerve impulses.
4. A child with a ruptured appendix is receiving antibiotics to treat peritonitis. This serious infection involves the \_\_\_\_\_, the membrane that lines the \_\_\_\_\_ cavity.
5. An elderly man has arthritis of the knees. The joint pain that accompanies arthritis may be due to inflammation of the \_\_\_\_\_ membrane that lines the joint cavities or damage to the \_\_\_\_\_ (type of tissue) that covers the joint surfaces of bones.

**MULTIPLE CHOICE TEST # 1**

*Choose the correct answer for each question.*

1. An endocrine gland has:
  - a) a duct
  - no duct
  - no secretion
  - no blood supply
2. An example of an exocrine gland is the:
  - salivary gland
  - thyroid gland
  - pituitary gland
  - adrenal gland
3. The type of epithelium in which the surface cells alternate from round to flat is:
  - cupoidal
  - columnar
  - stratified squamous
  - transitional
4. The type of connective tissue with a liquid matrix called plasma is:
  - cartilage
  - bone
  - adipose
  - blood
5. Axon, dendrite, and cell body are the three parts of:
  - the brain
  - nerve tissue
  - a neuron
  - the central nervous system
6. The type of connective tissue with a solid matrix made of calcium salts is:
  - areolar
  - bone
  - cartilage
  - fibrous
7. The type of muscle tissue also known as voluntary muscle is:
  - smooth
  - cardiac
  - visceral
  - skeletal
8. The membrane that lines the digestive tract is a:
  - serous membrane
  - synovial membrane
  - muscos membrane
  - fascia



9. The serous membrane that lines the thoracic cavity is the:  
a) visceral pleura      b) peritoneum      c) parietal pleura      d) mesentery
10. In the fallopian tube, an egg cell is moved toward the uterus by:  
a) ciliated epithelium      c) nerve tissue  
b) striated muscle      d) cuboidal epithelium
11. To increase their surface area for absorption, columnar cells in the small intestine have:  
a) microvilli      b) cilia      c) goblet cells      d) ducts
12. The strong tissue that forms tendons and ligaments is:  
a) skeletal muscle      c) bone  
b) fibrous connective tissue      d) elastic connective tissue
13. The type of epithelium that makes up the outer layer of skin is:  
a) simple squamous      c) stratified squamous  
b) stratified columnar      d) simple columnar
14. The tissue that is thin enough to form capillaries and permit exchanges of materials is:  
a) smooth muscle      c) areolar connective tissue  
b) elastic connective tissue      d) simple squamous epithelium
15. The type of muscle tissue that produces a significant amount of body heat is:  
a) skeletal      b) smooth      c) cardiac      d) visceral
16. Cardiac muscle is found in:  
a) the heart and arteries      c) the heart only  
b) arteries only      d) arteries, veins, and the heart
17. The membranes that cover the brain and spinal cord are the:  
a) visceral cranial membranes      c) synovial membranes  
b) periosteum      d) meninges
18. The space between two neurons where a neurotransmitter carries the impulse is called a:  
a) cell body      b) matrix      c) Schwann cell      d) synapse
19. The unicellular glands that secrete mucus in the respiratory tract are:  
a) goblet cells      c) microvilli  
b) endocrine glands      d) serous glands
20. The tissue that transports nutrients and oxygen throughout the body is:  
a) nerve tissue      c) areolar connective tissue  
b) blood      d) serous tissue
21. The type of muscle tissue that provides peristalsis in the intestines is:  
a) skeletal      b) voluntary      c) striated      d) smooth
22. The type of connective tissue that stores excess energy in the form of fat is:  
a) fibrous      b) cartilage      c) elastic      d) adipose
23. The membrane that lines a joint cavity and produces fluid is the \_\_\_\_\_ membrane.  
a) mucous      b) synovial      c) serous      d) pleural

5. Which statement is NOT true of glands?
- exocrine glands have ducts to transport their secretions to other sites
  - the secretions of endocrine glands are called hormones
  - endocrine glands have no ducts, and their secretions enter capillaries
  - an example of an exocrine gland is the thyroid gland

*Reword your choice to make it a correct statement.*

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6. Which statement is NOT true of muscle tissue?
- skeletal muscle in the iris of the eye changes the size of the pupil
  - cardiac muscle forms the heart and pumps blood
  - smooth muscle provides peristalsis in the intestines
  - skeletal muscle moves the skeleton

*For your choice, name the muscle tissue that does have this function.*

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7. Which statement is NOT true of nerve tissue?
- transmission of impulses at synapses depends upon chemicals called neurotransmitters
  - nerve tissue makes up the peripheral nerves, spinal cord, and brain
  - Schwann cells produce the myelin sheath for peripheral neurons
  - the axon of a neuron carries impulses toward the cell body

*Reword your choice to make it a correct statement.*

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8. Which statement is NOT true of blood?
- white blood cells destroy pathogens and provide immunity
  - nutrients and waste products are transported by red blood cells
  - red blood cells contain hemoglobin to carry oxygen
  - platelets are important for clotting to prevent blood loss

*Reword your choice to make it a correct statement.*

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9. Which statement is NOT true of the connective tissues?
- adipose tissue stores protein as a potential energy source
  - fibrous connective tissue makes up tendons that connect muscle to bone
  - areolar connective tissue is found between the skin and the muscles
  - elastic connective tissue around the alveoli contributes to normal exhalation

*Reword your choice to make it a correct statement.*

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10. Which statement is NOT true of the epithelial tissues?
- transitional epithelium permits expansion of the urinary bladder
  - simple cuboidal epithelium in the salivary glands secretes saliva
  - stratified squamous epithelium of the outer layer of skin has living cells on the surface
  - simple squamous epithelium in the alveoli permits exchange of gases

*Reword your choice to make it a correct statement.*

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24. The tissue in the wall of the trachea that keeps it open is:  
a) bone      b) fibrous tissue      c) cartilage      d) areolar tissue
25. The type of connective tissue beneath mucous membranes that contains many white blood cells is:  
a) areolar      b) fibrous      c) elastic      d) cartilage

## MULTIPLE CHOICE TEST #2

*Read each question and the four answer choices carefully. When you have made a choice, follow the instructions to complete your answer.*

1. Which tissue does NOT contribute to the functioning of the trachea?  
a) ciliated epithelium sweeps mucus and pathogens to the pharynx  
b) cartilage rings keep the trachea open  
c) goblet cells produce mucus  
d) columnar epithelium absorbs nutrients

*For your choice, state the correct location of the tissue with this function.*

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2. Which tissue does NOT contribute to the functioning of an artery?  
a) simple squamous epithelium forms the lining and prevents abnormal clotting  
b) cardiac muscle pumps blood  
c) elastic connective tissue helps maintain normal blood pressure  
d) smooth muscle tissue helps maintain normal blood pressure

*For your choice, state the correct location of the tissue with this function.*

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3. Which epithelial membrane is NOT paired with its proper location?  
a) peritoneum—lines the thoracic cavity  
b) mucous membrane—lines the urinary tract  
c) mesentery—covers the abdominal organs  
d) visceral pleura—covers the lungs

*For your choice, state its correct location.*

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4. Which of the following does NOT contribute to the structure and function of bones?  
a) the periosteum is a membrane that covers the bone  
b) calcium salts in the bone matrix provide strength  
c) cartilage on joint surfaces is smooth to prevent friction  
d) bones are moved by smooth muscle

*Reword your choice to make it a correct statement.*

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