Name: _____ Lab Time: _____

Tissues
Study Guide, Chapter 3

Part I. Clinical Applications

1. Pathologists are very knowledgeable in histology. Why is histology important in medical care?

2. Vitamin C is important to maintain health. What relationship does vitamin C have to tissue development in the body?

3. After a weight-loss program, why is the lost weight often regained quickly in the same areas of the body?

4. The knee joint is quite susceptible to injury involving the tearing of cartilage pads within the knee joint. In most cases, why is surgery needed?

5. After many years of smoking, Mr. Butts is plagued by a hacking cough. Explain the causes of this cough.

6. Assuming that you had the necessary materials to perform a chemical analysis of body secretions, how could you determine whether a secretion was merocrine or apocrine?

7. You are working in a pathology lab and are asked to develop a two-step scheme that can be used to identify the three types of muscle tissue. What would the two steps be?

8. Mike has had a series of respiratory tract infections this winter. His doctor has just prescribed a mucus-thinning drug. Using your knowledge of the structure of the mucus membrane lining the respiratory tract, how do you think this type of drug will help Mike get better?

9. Janelle has been an anorexic for several years. As a result of her chronically low daily caloric intake, her adipocytes are storing little or no triglycerides. What structural problems might she suffer as a result?

10. The neighborhood kids are walking around with common pins and sewing needles stuck into their fingertips. There is no visible bleeding. What type of tissue have they pierced? How do you know?

Part II

(3)

Using the terms below, complete the following statements.

chemotherapy	exocytosis	epithelial	stroma
necrosis	skeletal	recticular	cancer
endothelium	abscess	goblet cells	
	collagen	neuroglia	
neural/nervous	connective	mesothelium (Serous membranes)	
lamina propria		dense regular connective tissue	

1. The four primary tissue types found in the body are connective, muscle, epithelial, and _____.
2. The type of tissue that makes up the surface of the skin is _____.
3. The epithelium that lines the body cavity is the _____.
4. The lining of the heart and blood vessels is called a(n) _____.
5. In merocrine secretion, the product is released through _____.
6. Of the four primary types, the tissue that stores energy in bulk quantities is _____.
7. The most common fibers in connective tissue proper are _____ fibers.
8. Connective tissue fibers forming a branching, interwoven framework that is tough but flexible describes _____ fibers. Hint: Found in Spleen & Liver
9. The loose connective tissue of a mucous membrane is called the _____.
10. The only type of muscle tissue that is under voluntary control is _____.
11. Neural tissue contains several different kinds of supporting cells called _____.
12. The death of cells or tissues from disease or injury is referred to as _____.
13. An accumulation of pus in an enclosed tissue space is called an _____.
14. The only example of unicellular exocrine glands in the body is that of _____.
15. Methods that involve the administration of drugs that kill cancerous tissues or prevent mitotic divisions are called _____.
16. Oncologists are physicians who specialize in the identification and treatment of _____.
17. The basic framework of reticular tissue found in the liver, spleen, lymph nodes, and bone marrow is the _____.
18. Tendons, aponeuroses, fascia, elastic tissue, and ligaments are all examples of _____.

19. A type of junction common in cardiac and smooth muscle tissues is the
(a) desmosome (b) basal lamina
(c) tight junction (d) gap junction

20. The most abundant connections between cells in the superficial layers of the skin are
(a) connexons (b) gap junctions
(c) desmosomes (d) tight junctions

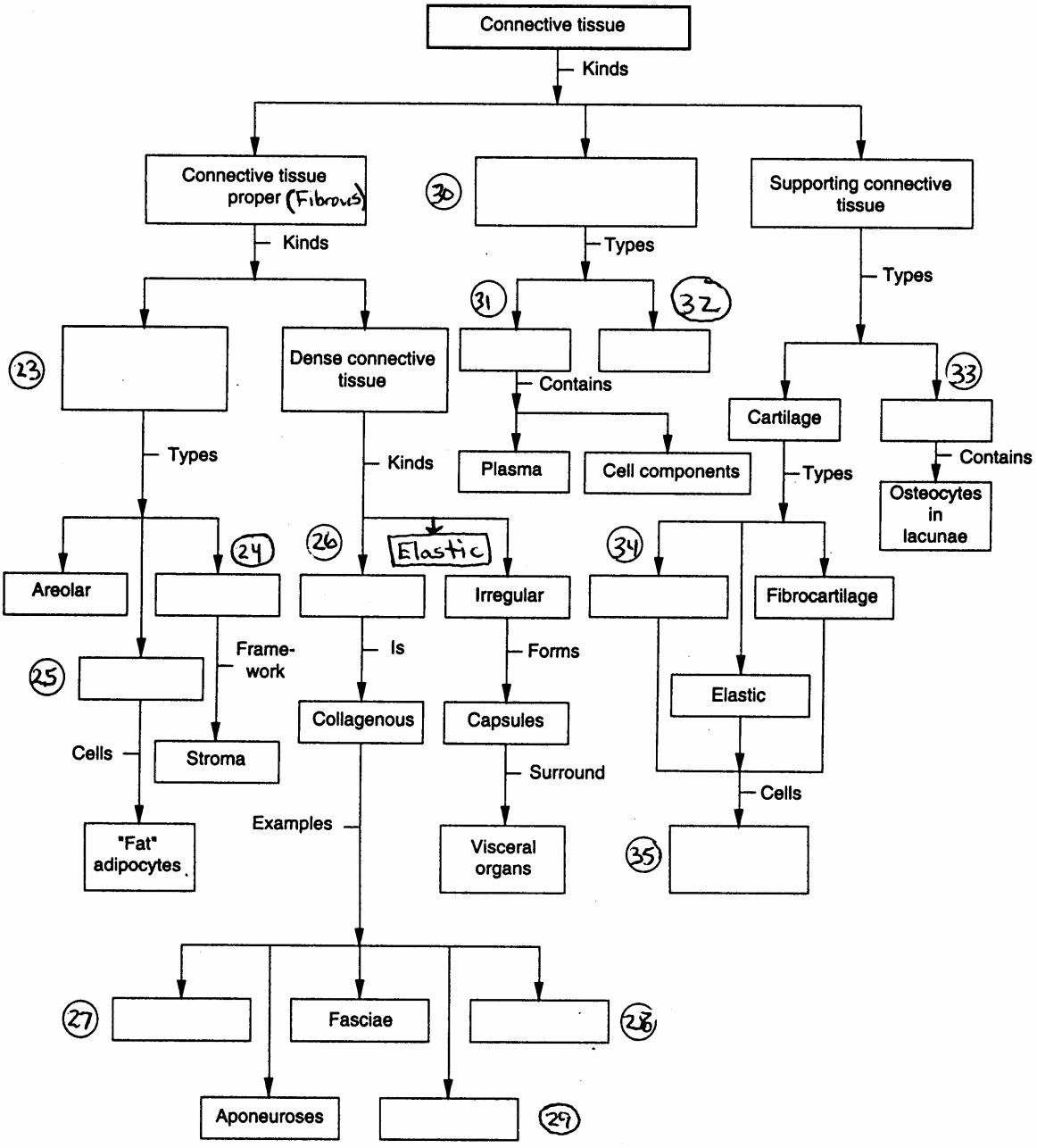
21. _____ membranes have an epithelium that is stratified and supported by dense connective tissue.
(a) Synovial (b) Serous
(c) Cutaneous (d) Mucous

22. Mucous secretions that coat the passageways of the digestive and respiratory tracts result from _____ secretion.
(a) apocrine (b) merocrine
(c) holocrine (d) endocrine

CONCEPT MAP

Using the following terms, fill in the circled, numbered, blank spaces to complete the concept map. Follow the numbers that comply with the organization of the concept map. (4)

Ligaments	Loose connective tissue	Regular
Bone	Chondrocytes in lacunae	Tendons
Adipose	Fluid connective tissue	Blood
Hyaline	Lymph	Sclera
		Reticular



36. Matrix is a characteristic of which type of tissue?
(a) epithelial (b) neural
(c) muscle (d) connective

37. The three basic types of fibers in connective tissue are
(a) tendons, ligaments, and elastic ligaments
(b) loose, dense, and irregular
(c) cartilage, bone, and collagen
(d) collagen, reticular, and elastic

38. The cell junction that prevents movement of a substance through intercellular routes is a(n)

A. gap junction
B. tight junction
C. adherens junction
D. A and B are both correct
E. B and C are both correct

Match the terms in column B with the terms in column A. Use letters for answers in the spaces provided.

COLUMN A		COLUMN B
____ 39	histology	A. trachea
____ 40.	covering epithelia	B. absorption
____ 41	glandular epithelia	C. fixed cells
____ 42	microvilli	D. incomplete cellular layer
____ 43	cilia	E. study of tissues
____ 44	fibroblasts	F. wandering cells
____ 45	mast cells	G. exocrine
____ 46	synovial membrane	H. epidermis
____ 47	elastic ligaments	J. dendrites
____ 48	muscle tissue	K. movement
____ 49.	neuron	M. interconnects vertebrae

50. _____ epithelium lines part of male urethra, large excretory ducts of some glands, and a small area of anal mucous membranes.

A. stratified squamous
B. simple columnar
C. simple cuboidal
D. stratified columnar
E. pseudostratified

51 The modifications to the columnar epithelium include

A. microvilli
B. cilia
C. mucus production (goblet cells)
D. all of the above
E. A and B only

52 Basement membranes are characteristically associated with which of the following tissues?

A. hyaline cartilage
B. muscle
C. pseudostratified columnar
D. nervous
E. osseous

53 The secretion from which type of gland involves the death and discharge of the cell producing the secretion?

A. apocrine
B. holocrine
C. merocrine
D. A and B are correct
E. B and C are correct

54. Which of the following is NOT associated with the osteon?

A. lacuna
B. canaliculi
C. lamella
D. chondrocyte
E. osteocyte

55. Which of the following tissues is avascular?

A. bone
B. cartilage
C. epithelium
D. loose connective
E. B and C

56 _____ muscle tissue is characterized by branched cylinder-shaped cells, only one nucleus, and intercalated discs which contain anchoring and communicating junctions.

A. skeletal
B. smooth
C. cardiac
D. A and B are both correct
E. none of the above are correct

57 Which type of connective tissue forms tendons and ligaments?

A. areolar
B. dense regular
C. dense irregular
D. elastic
E. reticular

58. The protein substance in epithelium tissue that is resistant to friction is called

A. hyaluronic acid
B. chondroitin sulfate
C. keratin
D. dermatan sulfate
E. keratan sulfate

59. The term matrix refers to _____, which are outside the cells.

A. intercalated discs
B. ground substance and fibers
C. collagen fibers only
D. elastic fibers only
E. reticular fibers only

60. _____ are single, long processes of the neuron that conduct nerve impulses away from the cell body.

A. axons
B. dendrites
C. neuroglia
D. none of the above are correct

61. The type of tissue that lines the bladder is

A. simple columnar
B. transitional
C. dense irregular
D. areolar
E. pseudostratified

Part III **BODY TREK:**

(6)

To complete the body trek to study tissues, the micro-robot will be used in an experimental procedure by a pathologist to view and collect tissue samples from a postmortem examination. Robo is equipped with a mini camera to scan body cavities and organs and will use its tiny arm with a blade to retrieve tissue samples for study. The procedure avoids the necessity of severe invasive activity but allows a complete "tissue autopsy" to determine the ultimate cause of death. The tissue samples will be collected by the robot, taken to the laboratory for preparation, microscopically analyzed, and a report will be written and filed by the pathologist and *you*. All descriptions of the tissues will be designated as normal or abnormal. The report will be categorized as follows:

Body location; tissue type; description/appearance; N; A.

Using the terms listed below, complete the report relating to the body tissues by entering your responses in the blank spaces. The letter *N* refers to *normal*; the letter *A* to *abnormal.*

Epithelia	*Connective*	*Muscle*	*Neural*
Simple cuboidal	Chondrocytes in lacunae	Heart	Neurons–Axons
Trachea Mucosa (ciliated)	Tendons; Ligaments	Skeletal	Dendrites
Stratified squamous	Cardiovascular system	Nonstriated	Neuroglia
Layers of column-like cells	Irregular dense fibrous	Uninucleated	Support cells
Transitional	External ear; Epiglottis		
Simple squamous	Hyaline cartilage		
	Bone or Osseous		
	Adipose		

Body Location	Tissue Type	Description/Appearance	N	A
EPITHELIAL				
Mucous Membrane Lining of Mouth & Esophagus	(1)	Multiple Layers of Flattened Cells	X	
Mucosa of Stomach & Large Intestine	Simple Columnar	Single Rows of Column-Shaped Cells	X	
(2)	Pseudostratified Columnar	One Cell Layer – Cells Rest on Basement Membrane – (Evidence of Decreased Number of Cilia)		X
Respiratory Surface of Lungs	(3)	Single Layer of Flattened Cells (Excessive Number of Cells & Abnormal Chromosomes Observed)		X
Sweat Glands	Stratified Cuboidal	Layers of Hexagonal or Cube-like Cells	X	
Collecting Tubules of Kidney	(4)	Hexagonal Shape Neat Row of Single Cells	X	
Mucous Membrane Lining of Urinary Bladder	(5)	Cells with Ability to Slide Over One Another, Layered Appearance	X	
Male Urethra	Stratified Columnar	(6)	X	

Body Location	Tissue Type	Description/Appearance	N	A
CONNECTIVE				
Subcutaneous Tissue; Around Kidneys; Buttocks, Breasts	(7)	Closely Packed Fat Cells	X	
Widely Distributed Packages Organs; Forms Basement Membrane of Epithelial	Areolar (loose)	Three Types of Fibers; Many Cell Types	X	
(8)	Regular Dense Fibrous	Fibroblasts in Matrix, Parallel Collagenic and Elastic Fibers	X	
Dermis; Capsules of Joints; Fascia of Muscles	(9)	Fibroblast in Matrix, Irregularly Arranged Fibers	X	
Ends of Long Bones; Costal Cartilages of Ribs; Support Nose, Trachea, Larynx	(10)	Chondrocytes in Lacunae, Groups 2-4 Cells	X	
Intervertebral Disks Disks of Knee Joints	Fibro Cartilage	(11)	X	
(12)	Elastic Cartilage	Chondrocytes in Lacunae	X	
Skeleton	(13)	Osteocytes in Lacunae, Vascularized	X	
(14)	Blood	Liquid – Plasma RBC, WBC, Platelets	X	
MUSCLE				
Attached to Bones	(15)	Long; Cylindrical; Multinucleate	X	
(16)	Cardiac	Cardiocytes; Intercalated Disks	X	
Walls of Hollow Organs; Blood Vessels	Smooth	(17)	X	
NEURAL				
Brain; Spinal Cord; Peripheral Nervous System	Neural	(18)	X	

(End of Report)

This report confirms that death was due to metaplasia and anaplasia caused by excessive smoking. The tumor cancer cells in the lungs had extensive abnormal chromosomes.

Fill in the blanks.

19. All connective tissue is derived from _____.

20. _____ surrounds the surface of most cartilage.

21. _____ glands have ducts and secrete their products to the surface through these ducts.

22. The word that would best describe the blood supply to all connective tissue except cartilage is _____.

23. The serous membrane that lines the thoracic cavity and covers the lungs is called the _____.

Match the description with the proper muscle tissue.

1. striated and voluntary
2. striated and involuntary
3. nonstriated and involuntary

24 _____ Smooth muscle

25 _____ Skeletal muscle

26 _____ Cardiac muscle

Match each of the following serous membranes with its location.

1. pleura
2. pericardium
3. peritoneum

27. _____ Lines the heart cavity and covers the heart.

28. _____ Lines the thorax cavity and covers the lungs.

29. _____ Lines the abdominal cavity and covers the abdominal organs.

Test your knowledge of membranes by filling in the following table.

Name	Location	Functions
Mucous	(30)	(31)
(32)	Lines body cavities not open directly to exterior	(33)
(34)	(35)	Secretes fluid that lubricates articular cartilage at joints.

Check your understanding of embryonic and mature connective tissues by answering these questions.

36. *(Mesenchyme? Mucous connective tissue?)* is the tissue from which all other connective tissues derive.

37. The combining of areolar connective tissue with adipose tissue forms the _____ layer. Hint: Attaches skin to underlying tissue

38 The accumulation of a large triglyceride droplet pushes the cytoplasm and nucleus to the edge of the cell in this tissue: _____.

39. *(Dense regular? Dense irregular?)* connective tissue is associated with the heart valves, periosteum, joint capsules, and pericardium of the heart.

40 The cells of mature cartilage are called _____.

41 The surface of cartilage is surrounded by dense connective tissue called _____.

Match the following types of cartilage with their proper description or location.

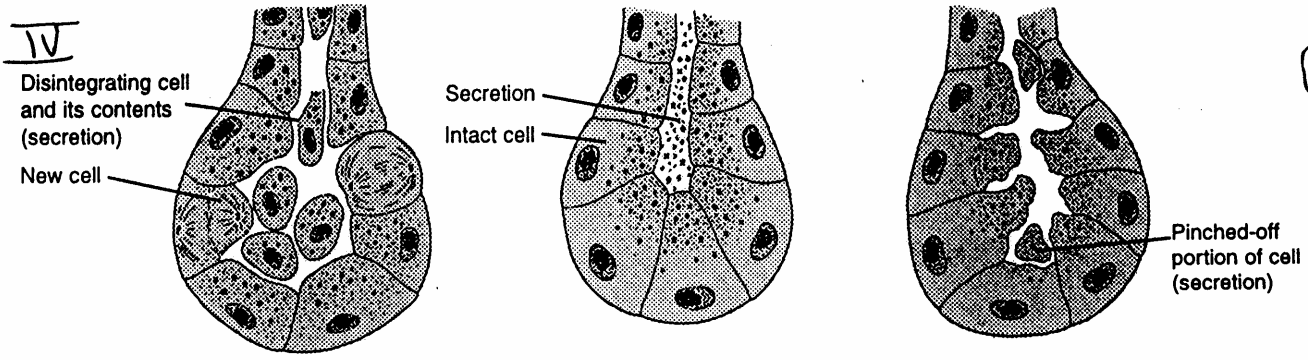
elastic cartilage | fibrocartilage | hyaline cartilage

42. _____ Maintains the shape of the epiglottis, external ear, and auditory tubes.

43. _____ Forms the intervertebral discs and pubic symphysis as well as the menisci of the knees.

44. _____ Found covering the ends of the long bones and anterior ends of the ribs, and helps to form parts of the nose, larynx, trachea, and bronchi.

Part IV



1 _____ 2 _____ 3 _____

Functional classification of multicellular exocrine glands.

Label the parts of Figure as holocrine, merocrine, or apocrine.

Differentiate between

4 exocrine glands _____

5. endocrine glands _____

Connective Tissue

Answer (T) true or (F) false to the following questions about the general features of connective tissue.

6 _____ Ground substance plus fibers are referred to as the matrix.

7. _____ Connective tissue does occur on free surfaces.

8. _____ All connective tissue is highly vascular.

9. _____ The matrix largely determines the qualities of the connective tissue.

10 _____ All connective tissue has a nerve supply.

Name the two types of epithelial tissue.

11 _____

12. _____

Answer the following questions (T) true or (F) false.

13. _____ Epithelium consists of loosely packed cells with little extracellular substance.

14. _____ Epithelia are avascular.

15. _____ Epithelial cells are arranged in a continuous sheet that may be single- or multi-layered.

16. _____ Epithelium has a low capacity for renewal.

17. _____ Epithelial cells rest on a structure called the basement membrane.

18. _____ Functions of epithelia include protection, filtration, and absorption.

Match the following covering and lining epithelium with the correct description.

pseudostratified	simple	stratified

F1. _____ Has only one layer of cells; some cells do not reach the surface.

20. _____ Arranged in single layer; function in absorption and filtration.

21. _____ Cells stacked in several layers; in areas of wear and tear.

Write EXO before descriptions of *exocrine* glands and ENDO before descriptions of *endocrine* glands. (Endocrine glands will be studied further in Chapter 13.)

22. Their products are secreted into ducts that lead either directly or indirectly to the outside of the body.

23. Their products are secreted into ECF and then the blood and so stay within the body; they are ductless glands.

24. Examples are glands that secrete sweat, oil, mucus, and digestive enzymes.

25. Examples are glands that secrete hormones.

Match the common types of dense regular connective tissue with the descriptions.

Aponeurosis	Ligament	Tendon

26. Connects muscles to bones

27. Holds bones together at joints

28. Flat band or sheet of tissue connecting muscles to each other or to bones

Do this activity about cartilage tissue.

29. Mature cartilage cells are known as _____-cytes. These are located in spaces known as _____ ("little lakes") surrounded by a dense, rubbery matrix.

30. In general, cartilage can endure (*more? less?*) stress than other connective tissues studied so far. The type of cartilage located where strength and rigidity are especially needed, as between hipbones and in discs between vertebrae, is (*elastic? fibrous? hyaline?*). This type of cartilage contains large numbers of (*collagen? elastic?*) fibers.

31. The type of cartilage that is white and glossy and forms articular and rib cartilages is (*elastic? fibrous? hyaline?*). This type of cartilage is the (*most? least?*) abundant type of cartilage in the body.

32. Cartilage heals (*more? less?*) rapidly than bone. Explain why this is so.

Check your understanding of membrane types by doing this exercise.

33 The serous membrane covering the heart is known as the _____, whereas that covering the lungs is called the _____. The serous membrane over abdominal organs is the _____.

34 The portion of serous membranes that covers organs (viscera) is called the _____ layer; the portion lining the cavity is named the _____ layer.

35 A _____ membrane secretes a lubricating fluid known as synovial fluid, and is found lining _____. Such a membrane (*does? does not?*) contain epithelium, so it (*is? is not?*) classified as an epithelial membrane.

36 The fourth type of membrane in the body is the skin which is also known as the _____ membrane.

37. Which term refers to microscopic fingerlike projections that increase the surface of the plasma membrane?

A. Microvilli
B. Basement membrane
C. Cilia
D. Goblet cells

38. The serous membrane covering the stomach and liver is known as the:

A. Pericardium
B. Peritoneum
C. Pleura
D. Synovium

39 Simple epithelial cells are characteristic of regions where:

a. mechanical or chemical stresses occur
b. support and flexibility are necessary
c. padding and elasticity are necessary
d. secretion and absorption occur

Fill-ins. Write the word or phrase that best fits the description.

(11)

_____ 40. Ground substance and fibers together form the _____ of connective tissue.

_____ 41. The type of epithelium that lines the inside of the urinary bladder is _____ .

_____ 42. The kind of tissue that lines alveoli (air sacs) of lungs is _____ .

_____ 43. The kind of tissue that contains lacunae and chondrocytes is _____ .

_____ 44. Tissue that forms the thick surface layer of skin on hands and feet, providing extra protection, is _____ .

____ 45. The four primary tissue types found in the human body are:

a. squamous, cuboidal, columnar, glandular
b. adipose, elastic, reticular, cartilage
c. skeletal, cardiac, smooth, muscle
d. epithelial, connective, muscle, neural

____ 46. The primary function of a *serous* membrane is to:

a. provide nourishment and support to the body lining
b. reduce friction between the parietal and visceral surfaces
c. establish boundaries between internal organs
d. line cavities that communicate with the exterior

____ 47. The two types of *layering* recognized in epithelial tissues are:

a. cuboidal and columnar
b. squamous and cuboidal
c. columnar and stratified
d. simple and stratified

____ 48. In contrast to serous or mucous membranes, the *cutaneous* membrane is:

a. thin, permeable to water, and usually moist
b. lubricated by goblet cells found in the epithelium
c. thick, relatively waterproof, and usually dry
d. covered with a specialized connective tissue, the lamina propria

____ 49. The types of cells that form glandular epithelium that secrete enzymes and buffers in the pancreas and salivary glands are:

a. simple squamous epithelium
b. simple cuboidal epithelium
c. stratified cuboidal epithelium
d. transitional epithelium

____ 50 The type of epithelial tissue found along the ducts that drain sweat glands is:

a. transitional epithelium
b. simple squamous epithelium
c. stratified cuboidal epithelium
d. pseudostratified columnar epithelium

____ 51. Three methods used by glandular epithelial cells to release secretions are:

a. serous, mucous, and mixed secretions
b. alveolar, acinar, tubuloacinar secretions
c. merocrine, apocrine, holocrine secretions
d. simple, compound, tubular secretions

____ 52. Milk production in the breasts and underarm perspiration occur through:

a. holocrine secretion
b. apocrine secretion
c. merocrine secretion
d. tubular secretion

53. The common factor shared by the three connective tissue fiber types is that all three types are:

a. formed through the aggregation of protein subunits
b. abundant in all major organs in the body
c. resistant to stretching due to the presence of ground substance
d. springy, resilient structures capable of extensive stretching

54 The three basic components of all connective tissues are:

a. free exposed surface, exocrine secretions, endocrine secretions
b. fluid matrix, cartilage, osteocytes
c. specialized cells, extracellular protein fibers, ground substance
d. satellite cells, cardiocytes, osteocytes

55. The three classes of connective tissue based on structure and function are:

a. fluid, supporting, and connective tissue proper
b. cartilage, bone, and blood
c. collagenic, reticular, and elastic
d. adipose, reticular, and ground

56. The pads that lie between the vertebrae of the spinal column contain:

a. elastic fibers
b. fibrocartilage
c. hyaline cartilage
d. dense, regular connective tissue

57. The three major types of cartilage found in the body are:

a. collagen, reticular, and elastic cartilage
b. regular, irregular, and dense cartilage
c. hyaline, elastic, and fibrocartilage
d. interstitial, appositional, and calcified

58. The major function of *neurons* in neural tissue is:

a. to provide a supporting framework for neural tissue
b. to regulate the composition of the interstitial fluid
c. to act as phagocytes that defend neural tissue
d. to transmit signals that take the form of changes in the transmembrane potential

59 Structurally, neurons are unique because they are the only cells in the body that have:

a. lacunae and canaliculi
b. axons and dendrites
c. satellite cells and neuroglia
d. soma and stroma

60. Which statement about connective tissue is *false?*

A. Cells are very closely packed together.
B. Most connective tissues have an abundant blood supply.
C. Matrix is present in large amounts.
D. It is the most abundant tissue in the body.

61. All of the following are secretions from exocrine glands *except*:

A. Adrenal gland hormones
B. Perspiration
C. Mucus
D. Digestive enzymes
E. Ear wax (cerumen)

62. The four basic types of tissue in the body are

(a) epithelial, connective, muscle, and neural
(b) simple, cuboidal, squamous, and stratified
(c) fibroblasts, adipocytes, melanocytes, and mesenchyme
(d) lymphocytes, macrophages, microphages, and adipocytes

Part IV

Using the key choices, correctly identify the *major* tissue types described. Enter the appropriate letter or tissue type term in the answer blanks.

13

Key Choices

Connective Epithelium Muscle Nervous

_____ 1. Forms mucous, serous, and epidermal membranes

_____ 2. Allows for organ movements within the body

_____ 3. Transmits electrochemical impulses

_____ 4. Supports body organs

_____ 5. Cells of this tissue may absorb and/or secrete substances

_____ 6. Basis of the major controlling system of the body

_____ 7. The cells of this tissue shorten to exert force

_____ 8. Forms hormones

_____ 9. Packages and protects body organs

_____ 10. Characterized by having large amounts of nonliving matrix

_____ 11. Allows you to smile, grasp, swim, ski, and shoot an arrow

_____ 12. Most widely distributed tissue type in the body

_____ 13. Forms the brain and spinal cord

Using the key choices, identify the following specific type(s) of epithelial tissue. Enter the appropriate letter or classification term in the answer blanks.

Key Choices

Pseudostratified columnar (ciliated) Simple cuboidal Stratified squamous

Simple columnar Simple squamous Transitional

_____ 14. Lines the esophagus and forms the skin epidermis

_____ 15. Forms the lining of the stomach and small intestine

_____ 16. Best suited for areas subjected to friction

_____ 17. Lines much of the respiratory tract

_____ 18. Propels substances (e.g., mucus) across its surface

_____ 19. Found in the bladder lining; peculiar cells that slide over one another

_____ 20. Forms thin serous membranes; a single layer of flattened cells