Temple University School of Medicine
Department of Pathology and Laboratory Medicine
Pathology (D305) Examination I Version 2
September 24, 2009

IMPORTANT: Read the following instructions.

1. Write examination version number in the space of section number on the examination answer sheet.

2. Fill in your name and the last four digits of your Temple identification number on your answer sheet and darken the corresponding circles with a #2 pencil.

3. There are seventy five (75) items (questions) on this examination. There is only one answer to each item. Choose the best correct answer to a question or response to finish the statement of each item.

4. Use a #2 pencil to mark your answers on your answer sheet. Mark your answer right after you chose one. There is no extra time at the end of the examination. The examination time is one and a half hours.

5. Keep your eyes on your own examination paper and answer sheet. Place your own examination paper and answer sheet on your table top and prevent them from being exposed to others.

6. Students are not allowed to bring electronic devices or other miscellaneous items to the examination.

7. Proctors are not allowed to explain questions during examination.

B 1. Ischemia/hypoxia causes what type of necrosis in all tissues/organs except the brain?

A. Caseous
B. Coagulative
C. Gangrenous
D. Fibrinous
E. Purulent

A 2. Ischemia/hypoxia causes what type of necrosis in the brain?

A. Liquefactive
B. Fibrinous
C. Gangrenous
D. Coagulative
E. Caseous

C 3. Lipofuscin granules represent lipid peroxidation in which cellular organelles/structures?

A. Mitochondria
B. Rough endoplasmic reticulum
C. Lysosomes
D. Smooth endoplasmic reticulum
E. Microtubules

A 4. How does radiation energy cause cell injury?

A. Splitting water molecules to produce free radicals
B. Binding directly to the cell membrane
C. Stimulating the p450 oxidase system
D. Binding indirectly to the sulfhydryl group of enzymes
E. Activating synthesis of microtubules

C 5. Which type of cells is most sensitive to ischemic/hypoxic injury?

A. Oral epithelial cells
B. Myocardial cells
C. Neurons
D. Fibroblasts
E. Chondrocytes

D

6. What is the most common cause for fatty liver?

A. High fat diet
B. Cigarette smoking
C. Low fiber diet
D. Excess alcohol use
E. Vitamin A deficiency

E

7. Calcification of cell debris in atherosclerosis is what type of calcification?

A. Paradoxical calcification
B. Metastatic calcification
C. Reparative calcification
D. Metaplastic calcification
E. Dystrophic calcification

D

8. Rounded, eosinophilic bodies resulting from accumulation of immunoglobulins in degenerating plasma cells, often observed in chronic periodontitis, are called what?

A. Foam cells
B. Councilman bodies
C. Alcoholic hyaline droplets
D. Russell bodies
E. Abscess

A

9. In a hypertensive patient, myocardial fibers (cells) undergo what type of adaptive change?

A. Hypertrophy
B. Hyperplasia
C. Atrophy
D. Metaplasia
E. Dysplasia

B

10. In prostate nodular hyperplasia, the glandular cells exhibit what kind of change?

A. Decreased secretion
B. Increased DNA synthesis
C. Decreased cell size
D. Accumulation of lipid globules
E. Increased autophagy

C

11. Lipofuscin granules are most commonly seen in which condition?

A. Anaplasia
B. Hyperplasia
C. Atrophy
D. Hypoplasia
E. Hypertrophy

E

12. What is the most common cause of squamous metaplasia of the respiratory columnar epithelium?

A. Excess alcohol consumption
B. Vitamin D deficiency
C. Insufficient dietary cholesterol
D. Excess vitamin A
E. Cigarette smoking

E

13. Which of the following agents/factors most commonly accounts for the death of myocardial fibers in adults?

A. Alcohol
B. Oral flora
C. Radiation
D. Genetic defect
E. Hypoxia

D

14. What are the cardinal microscopic signs of cell death?
(1) hyperchromatism, (2) pyknosis, (3) mitosis, (4) karyorrhexis, (5) karyomegaly, (6) karyolysis

A. (1), (3), and (5)
B. (1), (5), and (6)
C. (2), (3), and (4)
D. (2), (4), and (6)
E. (3), (5), and (6)

E

15. What is the critical morphologic change in injured cells that determines the injury is irreversible?

A. Increase in cell size with increased cellular substance
B. Decrease in cell size with decreased cellular substance
C. Increase in cell number with increased mitotic figures
D. Decrease in mitochondria number with decreased ATP production
E. Breakage of cell membrane with exit of cellular enzymes

A

16. Inflammation of lymphatic channels is:

A. lymphangitis.
B. lymphadenitis.
C. lymphoma.
D. lymphoid hyperplasia.
E. leukemia.

D

17. The principal components of an acute inflammatory reaction are:

A. lymphocytes, neutrophils, and basophils.
B. fibroblasts and endothelial cells.
C. macrophages, plasma cells, and neutrophils.
D. plasma proteins, plasma fluid as edema, and neutrophils.
E. plasma proteins, lymphocytes, and plasma cells.

C

18. Dimerization of which of the following cell surface molecules serves as a recognition site for transmigration of leukocytes (diapedesis) into the connective tissue?

A. E-selectin
B. Integrins
C. PECAM-1 (CD31)
D. Histamine
E. Thrombin

D

19. The inflammatory cell that is important in parasitic infections is the:

A. basophil.
B. mast cell.
C. plasma cell.
D. eosinophil.
E. platelet.

B

20. IgG, C3b and collectins all share a common function, which is:

A. to cause vasodilation of arterioles by endothelial retraction.
B. to act as opsonins.
C. to act as free radicals.
D. to convert hydrogen peroxide to HOCl in phagolysosomes.
E. to act as enzymes to destroy bacteria in phagolysosomes.

C

21. The increase in vascular permeability caused by a severe burn is most likely due to:

A. an increase in endothelial transcytosis.
B. endothelial contraction due to histamine.
C. direct endothelial injury.
D. delayed prolonged endothelial injury.
E. endothelial contraction due to leukotrienes.

A

22. The edema in acutely inflamed tissues is due to the presence of:

A. an exudate.
B. a transudate.
C. extravasated red blood cells.
D. excessive amounts of collagen.
E. proliferation of fibroblasts.

A

23. Which of the following mediators of inflammation is a principal cause of pain?

A. Prostaglandins
B. Leukotrienes
C. Lipoxins
D. Nitric oxide
E. Serotonin

B

24. The inflammatory mediators principally involved in causing the acute-phase response are:

A. C3a and C5a.
B. IL-1 and TNF.
C. prostacyclin and thromboxane A_2.
D. platelet activating factor and plasmin.
E. nitric oxide and superoxide free radicals.

D

25. A lack of synthesis of lysosomal myeloperoxidase results in the lack of production of:

A. superoxide free radical.
B. defensins.
C. hydroxyl free radical.
D. HOCl (hypochlorous free radical).
E. H_2O_2 (hydrogen peroxide).

E

26. Which of the following statements regarding histamine is true?

A. The principal source of histamine release in acute inflammation is fibroblasts.
B. The principal action of histamine in acute inflammation is to cause fever.
C. The principal enzyme that inactivates it is thrombin.
D. It is the most potent chemotactic agent.
E. It causes increased vascular permeability.

A

27. Which of the following molecules stimulates angiogenesis and fibroplasia and likely plays a central role in causing fibrosis during chronic inflammation is:

A. transforming growth factor-beta.
B. interferon-gamma.
C. epithelial growth factor.
D. IL-1.
E. substance P.

B

28. Which of the following molecules inhibits cyclooxygenase?

A. Arachidonic acid
B. Aspirin
C. Phospholipase A_2
D. Serotonin
E. Leukotriene C_4

E

29. The tensile strength of a healing wound is due mostly to:

A. the number of blood vessels in the granulation tissue.
B. the amount of fibrin clot that initially forms in the wound.
C. the number of fibroblasts present in the granulation tissue.
D. wound contraction.
E. the crosslinking of collagen fibers in the healing tissue.

C

30. Multinucleated giant cells are most characteristic of which of the following types of inflammation?

A. Fibrinous inflammation of the peritoneal cavity.
B. Abscess rich in neutrophils and pyogenic bacteria.
C. Granulomatous inflammation associated with a foreign body.
D. Suppurative inflammation of the dental pulp.
E. Serous inflammation associated with a friction blister.

B

31. In the context of tissue repair, fibroblasts and endothelium are best described as:

A. labile cells involved in constant turnover.
B. stable cells that can be stimulated to re-enter the cell cycle as needed.
C. permanent cells that have left the cell cycle and do not proliferate.
D. cells not involved in healing by first intention.
E. phagocytic cells.

A

32. Chediak-Higashi syndrome is:

A. an inherited defect that prevents fusion of phagosomes and lysosomes.
B. an inherited defect in endothelial selectins.
C. an acquired defect in IgG structure.
D. an inherited defect in myeloperoxidase.
E. an acquired defect in NADPH oxidase.

C

33. An inhibitor of several aspects of inflammation that is produced by transcellular biosynthesis is:

A. leukotriene D_4.
B. prostaglandin E_2.
C. lipoxin.
D. serotonin.
E. bradykinin.

B

34. Which of the following molecules serves as a non-oxygen dependent mechanism to kill bacteria?

A. NADPH oxidase
B. Arginine-rich cationic peptides (defensins)
C. Hydroxyl free radical
D. Myeloperoxidase
E. Superoxide

D

35. The arachidonic acid metabolite that promotes vasodilation and inhibits platelet adhesion is:

A. leukotriene C_4
B. leukotriene D_4
C. leukotriene B_4
D. prostaglandin I_2 (prostacyclin)
E. thromboxane A_2

A

36. Chronic granulomatous disease of childhood is caused by a deficiency of which of the following molecules?

A. NADPH oxidase
B. Myeloperoxidase
C. Lysozyme
D. Prostaglandin E_2
E. Leukotrience B_4

A

37. Most viral infections give rise to:

A. chronic inflammation.
B. acute inflammation.
C. purulent inflammation.
D. fibrinous inflammation.
E. suppurative inflammation.

A

38. The complement component that acts as an opsonin is:

A. C3b.
B. C3a.
C. C5a.
D. C4a.
E. the MAC complex.

E

39. Cells most characteristic of chronic inflammation are:

A. neutrophils and eosinophils.
B. neutrophils and mast cells.
C. neutrophils and T cells.
D. basophils and macrophages.
E. macrophages and lymphocytes.

E

40. In an experiment, peripheral blood T cells are placed in a medium that preserves their function. The lymphocytes are activated by contact with antigen and incubated for several hours. The supernatant fluid is found to contain a substance that is a major stimulator of monocytes and macrophages. Which of the following substances is most likely to stimulate these cells?

A. Histamine
B. Nitric oxide
C. Phospholipase A2
D. Bradykinin
E. Interferon-gamma

D

41. During the early vascular changes in acute inflammation, hemoconcentration in venules leads directly to:

A. transmigration of neutrophils.
B. vasodilation.
C. neutrophil chemotaxis.
D. stasis.
E. formation of platelet thrombi.

B

42. The principal mechanism to increase vascular permeability caused by histamine is:

A. leukocyte-mediated endothelial injury.
B. endothelial contraction.
C. endothelial retraction.
D. direct endothelial injury.
E. increased transcytosis.

D

43. A 67-year-old man has a myocardial infarct and survives. How would the healing process best be described?

A. Healing without involvement of myofibroblasts
B. Healing without scarring
C. Healing by first intention
D. Healing by second intention
E. Healing with scar formation complete by 7-10 days.

C

44. Myofibroblasts play an important role in wound healing because they:

A. phagocytose most of the necrotic debris formed during the inflammatory response.
B. secrete large amounts of antibody.
C. are responsible for wound contraction.
D. secrete large amounts of IL-1 and TNF giving rise to the acute phase response.
E. differentiate into endothelial cells to complete the process of angiogenesis.

D

45. A small biopsy of the lateral border of the tongue is performed and the wound is closed by sutures. The sutures are removed after one week and the surgical site heals without complications. Which of the following statements best describes the wound site 4 weeks post-operatively?

A. Margination of neutrophils has begun.
B. Edema of inflamed tissues has just reached its maximum.
C. Granulation tissue is just beginning to form.
D. Scar tissue with very few, if any, inflammatory cells is present.
E. Wound strength is 10% of normal.

46. Which of the following can cause petechial hemorrhage and edema of the gingiva?

A. Atherosclerosis of the lingual artery
B. Thrombosis of the jugular vein
C. Renal failure
D. Hyperparathyroidism
E. Vitamin C deficiency

47. Melena can indicate the presence of which of the following pathologic conditions?

A. Aphthous stomatitia
B. Urolithiasis
C. Pulmonary edema
D. Ulcerative colitis
E. Venous varicosity of the leg

48. What is the event immediately following hemorrhage in a tooth extraction socket?

A. Lysis of erythrocytes
B. Formation of a hematoma
C. Development of dense scar
D. Hyperplasia of hematopoietic tissue
E. Necrosis of the alveolar bone

49. What is the most important initiator for blood coagulation?

A. Tissue plasminogen activator
B. Tissue factor (thromboplastin)
C. von Willebrand factor
D. Vitamin K
E. Platelets

50. What is the most predominant influential factor for phlebothrombosis?

A. Atherosclerosis
B. Bacterial vasculitis
C. Arterial turbulence
D. Thrombocytosis
E. Stasis of the blood flow

A

51. What is the most common cause for pulmonary thromboembolism?

A. Phlebothrombosis
B. Aortic aneurysm
C. Coronary atheroma
D. Pulmonary hypertension
E. Patent foramen ovale

C

52. What type of necrosis is seen in an infarct in the brain?

A. Caseous necrosis
B. Fat necrosis
C. Liquefactive necrosis
D. Fibrinous necrosis
E. Gangrenous necrosis

D

53. What causes cell/tissue damages in shock patients?

A. Free radicals
B. Increased blood perfusion
C. Decreased urinary excretion
D. Hypoxia
E. Excess steroids

A

54. What is the pathogenic mechanism of diffuse subcutaneous edema in a patient with right heart failure?

A. Increased hydrostatic pressure in blood vessels
B. Decreased osmotic pressure in blood vessels
C. Lymphatic obstruction
D. Sodium and water depletion in tissues
E. Increased vascular permeability

D

55. Anasarca is most commonly observed in which of the following diseases?

A. Pulmonary tuberculosis
B. Brain tumor
C. Cardiac atrophy
D. Nephrotic syndrome
E. Leg vein thrombosis

B

56. Acites is most commonly a clinical manifestation of which disease?

A. Stomach ulcer
B. Liver cirrhosis
C. Pulmonary embolism
D. Brain abscess
E. Colon cancer

E

57. Pitting edema is a common manifestation of which of the following?

A. Pleural effusion
B. Ascites
C. Intestinal gangrene
D. Brain edema
E. Anasarca

A

58. Dependent edema is a prominent feature of which of the following?

A. Right heat failure
B. Left renal failure
C. Right lung cancer
D. Left lower leg gangrene
E. Hematoma in the right side of brain

C

59. Where are heart failure cells observed in a heart failure patient?

A. In the brain
B. In the heart
C. In the lung
D. In the kidney
E. In the leg

C

60. What is the most common cause for "nutmeg liver"?

A. Pulmonary hypoperfusion
B. Aortic thrombosis
C. Right heart failure
D. Liver cirrhosis
E. Portal hypertension

D

61. Which of the following is the most common cause of inherited mental retardation?

A. Down syndrome
B. DiGeorge syndrome
C. Klinefelter syndrome
D. Fragile X syndrome
E. Turner syndrome

B

62. Patients with Down syndrome get an extra chromosome 21 by which of the following?

A. Tripolar mitosis of the sperm cell
B. Meiotic non-dysjunction during oogenesis
C. Fusion of three fertilized ova
D. Nuclear division with no cytoplasmic division during spermatogenesis
E. Vertical splitting of the chromosome 21 by free radicals

B

63. Which of the following is a common manifestation of DiGeorge syndrome?

A. Hyperglycemia
B. Hypocalcemia
C. Hyperimmunoglobulinemia
D. Hypoproteinemia
E. Hyperlipidemia

A

64. Which of the following is the major clinical manifestation of a patient with the karyotype 47,XXY?

A. Hypogonadism
B. Atrophic breast
C. Increased body hair
D. Decreased length of long bones
E. Early onset of Alzheimer disease

C

65. What is the karyotype of Turner syndrome?

A. 47,XX,+21
B. 46, 22q11.2 deletion
C. 45,X
D. 47.XXX
E. 47,XX,del(Xq)

E

66. What is the transmission pattern of fragile X syndrome?

A. Autosomal dominant
B. Autosomal co-dominant
C. Maternal mitochondrial inheritance
D. Autosomal recessive
E. X-linked recessive

C

67. Which of the following is deficient in Leber hereditary optic neuropathy?

A. Lysosoml enzymes
B. Neurofilaments
C. Oxidative phosphorylation enzymes
D. Neurotubules
E. Tyrosinase in retinoblasts

A

68. Which of the following diseases is most likely to develop before age 20 years in a patient with Down syndrome?

A. Acute leukemia
B. Hepatic cirrhosis
C. Chronic renal failure
D. Acute myocardial infarction
E. Aortic dissection

C

69. A man with Marfan syndrome married a normal woman. What is the expected rate of Marfan syndrome in their biological sons?

A. 0 %
B. 25%
C. 50%
D. 75%
E. 100%

D

70. Many patients with Ehlers-Danlos syndrome have periodontal disease at an early age. What is the reason for this problem?

A. Insufficient formation of fibrillin
B. Excessive development of cementum
C. Sclerosis of alveolar bone
D. Defective synthesis of collagen
E. Lazy Langerhans cells in the periodontium

B

71. What is the basic cause of familial hypercholesterolemia?

A. Familial habit of high-fat diet
B. Defective LDL receptors
C. Reduced activity of lysosomal lipase
D. Deficiency of 3-hydroxy-3-methylglutaryl (HMG) coenzyme A reductase
E. Decreased activity of acyl-Co A: cholesterol acyltransferase (ACAT)

A

72. Phenylketonuria is transmitted as which trait?

A. Autosomal recessive trait
B. Autosomal dominant trait
C. Autosomal co-dominant trait
D. X-linked recessive trait
E. Trinucleotide repeat trait

E

73. Tay-Sachs disease is caused by deficiency of the enzyme hexosaminidase A. The non-degraded substrate Gm2 gangliosides are accumulated in which cellular organelle of the neural tissue?

A. The nucleus
B. The mitochondria
C. The mitotic spindle
D. The rough endoplasmic reticulum
E. The lysosomes

E

74. Which of the following disorders most commonly manifests prominent hepatomegaly?

A. Diabetes type I
B. Diabetes type II
C. McArdle disease
D. Pompe disease
E. Von Gierke disease

D

75. In von Recklinghausen disease type I, what is the finding in the oral cavity?

A. Enamel hypoplasia
B. Multiple exostoses (excess growths of bone)
C. Mobile teeth at early age
D. Neurofibromas in the mucosa
E. Xerostomia due to degeneration of salivary glands