GENERAL PATHOLOGY

Mark the correct answer.

1. During repair, which of the following substances is essential for procollagen fibers to transform into collagen fibers?
   a. Cortisone
   b. Carotene
   c. Ascorbic acid
   d. Prothrombin
   e. Thromboplastin

2. Monocytes give rise to:
   a. Macrophages
   b. Epithelioid cells
   c. Giant cells
   d. All the above
   e. None the above

3. In viral infections, which cell type usually predominates?
   a. Neutrophils
   b. Macrophages
   c. Eosinophils
   d. Lymphocytes
   e. Basophils

4. Fungal infections usually produce which type of inflammatory response?
   a. Acute fibrinopurulent
   b. Acute hemorrhagic
   c. Chronic granulomatous
   d. A and B
   e. None the above

5. Which tissue is the most susceptible to liquefactive necrosis following ischemic injury?
   a. Brain
   b. Intestine
   c. Liver
   d. Pancreas
   e. Heart

6. A 76 year old develops signs and symptoms suggestive of a myocardial infarction. Microscopic examination of the heart is most likely to reveal:
   a. Caseous necrosis
   b. Coagulation necrosis
   c. Enzymatic fat necrosis
d. Gangrenous necrosis
e. Liquefactive necrosis

7. In the process of necrosis, a reduction in the size of the nucleus and a condensation of nuclear material is known as:

   a. **Pyknosis**
   b. Karyolysis
c. Karyorrhexis
d. Metachromasia
e. Hypochromasia

8. Chronic granulomatous inflammation is characterized by all these except:

   a. Macrophages
   b. **Neutrophils**
c. Epitheliod cells
d. Giant cells
e. Lymphocytes

9. Cervical tissue from a 24 year old woman shows squamous epithelium of the endocervical canal which is normally lined by mucous secreting columnar epithelium. This is felt to be caused by:

   a. Bacterial infection
   b. **Chronic irritation**
c. Congenital defect
d. Genetic mutation
e. Immunologic disorder

10. Most pulmonary thromboemboli originate from:

   a. **Deep leg veins**
b. Inferior vena cava
c. Pelvic venous plexus
d. Portal vein
e. Cavernous sinus

11. The enzymes responsible for the liquefaction of tissue in an abscess are mainly:

   a. Lymphocytes
   b. Macrophages
c. Mast cells
d. Necrotic cells
e. Neutrophils

12. During the third trimester of pregnancy, prolactin secretion from the pituitary gland stimulates glandular epithelial cells of the breasticles to produce milk. The glandular epithelial cells typically respond by undergoing:

   a. Atrophy
   b. Dysplasia
c. Hyperplasia
d. Hypertrophy
e. Metaplasia

13. The underlying tissue damage in most cases of hemorrhagic infaction of the lung is:

a. Caseous necrosis
b. **Coagulation necrosis**
c. Fibrinoid necrosis
d. Gangrenous necrosis
e. Liquefaction necrosis

14. The principal types of proliferating cells in granulation tissue are:

a. Fibroblasts and macrophages
b. **Fibroblasts and endothelial cells**
c. Leukocytes and endothelial cells
d. Lymphocytes and fibroblasts
e. Macrophages and leukocytes

15. A 77 year old man dies after two years of progressive congestive heart failure that was refractory to treatment. On microscopic examination of the lungs, which of the following might you expect to see in the alveolar macrophages?

a. Apoptotic bodies
b. Autophagic vacuoles
c. **Hemosiderin pigment**
d. Karyorrhexis
e. Mitochondrial calcification

16. The erythema associated with acute inflammation is the result of:

a. **Dilatation of blood vessels**
b. Edema of interstitial tissue
c. Margination of leukocytes
d. Precipitation of fibrin
e. Thrombosis of blood vessels

17. A 55 year old female develops left ventricular heart failure and pulmonary congestion. If the congestion becomes chronic, it may eventually lead to which of the following pulmonary complications?

a. Alveolar pneumocyte hyperplasia
b. Gangrenous necrosis
c. Granulomatous inflammation
d. **Interstitial fibrosis**
e. Malignant neoplasms

18. Of the conditions listed below, the most common cause of delayed wound healing is

a. Foreign body reaction to sutures
b. **Infection**
c. Malnutrition
d. Vitamin c deficiency
e. Zinc deficiency

19. The most common underlying cause of fat emboli syndrome is:

a. Diabetes mellitus
b. Enzymatic fat necrosis
c. **Fractures of long bones**
d. Trauma to subcutaneous soft tissue
e. Steatosis

20. An 8 year old boy develops a sore throat, fever, and a clear nasal discharge indicative of the common cold. In the inflammatory infiltrate within the submucosal tissue of the nasopharynx you would expect to find predominance of:

a. Neutrophils
b. **Lymphocytes**
c. Mast cells
d. Eosinophils
e. Plasma cells

21. Of the following, caseous necrosis would most likely be associated with:

a. **pulmonary tuberculosis**
b. soft tissue abcesses
c. sore throat
d. thrombophlebitis
e. viral bronchitis

22. Of the following, the earliest step in the formation of a thrombus is usually:

a. Activation of thrombus
b. Development of fibrin plugs
c. **Endothelial injury**
d. Margination of leukocytes
e. Trapping of red cells

23. Most infarcts of the kidney are ultimately replaced by:

a. Cystic cavities
b. Calcium deposits
c. Granulomatous inflammation
d. Regenerated parenchyma
e. **Scar tissue**

24. Of the following cell types, the first which aggregate at the site of acute tissue injury are:

a. B-lymphocytes
b. Macrophages
c. **Neutrophils**
d. Plasma cells  
e. T-lymphocytes

25. Which of the following is most likely to have grossly identifiable lines of Zahn?

   a. Arterial Thrombus  
b. Capillary Thrombus  
c. Extravascular hematoma  
d. Postmortem Clot  
e. Venous Thrombus

26. Which of the following statements best defines the term “labile cells”?

   a. Cells in a continuous cycle of cell division  
b. Cells incapable of mitotic division  
c. Cells which have a constant but irregular mitotic rate  
d. Cells which rarely divide but proliferate in response to injury  
e. Cells that require the presence of growth factors for mitotic division

27. What are "heart failure" cells histologically seen in pulmonary edema?

   a. Hyperplasia of type II pneumocytes  
b. Hemosiderin laden macrophages  
c. Lipofuscin laden macrophages  
d. Hyperplasia of clara cells  
e. All the above

28. Psammoma bodies are seen in which neoplasm?

   a. Astrocytoma  
b. Meningioma  
c. Glioblastoma multiforme  
d. Cranyopharyngioma  
e. Chordoma

29. What is the most common pleural tumor?

   a. Squamous cell carcinoma  
b. Adenocarcinoma  
c. Atypical carcinoid  
d. Malignant mesothelioma  
e. Small cell carcinoma

**Mark the correct answer with A, and false answer with C.**

30. Common cold is caused by viruses, especially the adenoviruses. A

31. Allergic rhinitis is mediated by an IgE type I immune reaction. A

32. The cause of nasopharyngeal carcinoma is CMV. C
33. Sarcoidosis can involve almost any organ system and it is characterized by formation of caseating granuloma. C

34. Asbestosis is characterized by ferruginous bodies. A

35. Pneumocystis jiroveci pneumonia is the most common opportunistic infection in patients with Horner syndrome. C

36. Primary tuberculosis is the initial infection, characterized by formation of Ghon complex. A

**Connect vitamin deficiency with disorder which is caused by the lack of that vitamin.**

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>Disorder</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>37. Vitamin A</td>
<td>A) Wernicke-Korsakoff Sy</td>
<td>B1</td>
</tr>
<tr>
<td>38. Vitamin D</td>
<td>B) Cheilosis</td>
<td>B2</td>
</tr>
<tr>
<td>39. Vitamin K</td>
<td>C) Pellagra</td>
<td>B3</td>
</tr>
<tr>
<td>40. Vitamin B1 (thiamine)</td>
<td>D) Megaloblastic anemia</td>
<td>B12</td>
</tr>
<tr>
<td>41. Vitamin B2 (riboflavin)</td>
<td>E) Scurvy</td>
<td>C</td>
</tr>
<tr>
<td>42. Vitamin C</td>
<td>F) Night blindness</td>
<td>A</td>
</tr>
<tr>
<td>43. Vitamin B12 (cobalamin)</td>
<td>G) Rickets/osteomalacia</td>
<td>D</td>
</tr>
<tr>
<td>54. Vitamin B3 (niacin)</td>
<td>H) Hemorrhagic diathesis</td>
<td>K</td>
</tr>
</tbody>
</table>

**Mark the correct answer with A, and false answer with C.**

55. Marasmus is caused by deficiency of almost all nutrients, notably protein and calories. A

56. Anthracosis is a pigmentation of lung by inhaled carbon dust. A

57. Necrosis is physiological cell death within a living tissue. C

58. Hemosiderin is pigment which is considered to be indicative of free radical injury and lipid peroxidation. C

59. Sudan Black stain will help to identify amyloidosis by use of a polarizer to observe an apple green color. C

60. Apoptosis is programmed cell death. A

61. Dystrophic calcification occurs everywhere and it is a result of profound or sustained hypercalcemia. C

61. To see lipid you must get a frozen section and stain it for “oil red ” which stains lipids. A

62. The term hyaline change refers to any form of glassy, eosinophilic, relatively acellular change in H&E sections. A

63. Kwashiorkor is caused by protein deficiency, but with adequate caloric intake. A
Mark the correct answer.

64. A 56-year-old man with history of cigarette smoking presents with difficulty swallowing and a muffled voice. Laryngoscopy reveals a 2-cm laryngeal mass. If this mass is a malignant neoplasm, which of the following is the most likely histologic diagnosis?

a. Adenocarcinoma
b. Leiomyosarcoma
c. Small cell carcinoma
d. **Squamous cell carcinoma**
e. Transitional cell carcinoma

65. A 27-year-old man with history of alcoholism and repeated bouts of aspiration pneumonia comes to the emergency room with a high fever and pleuritic chest pain. Physical examination reveals dullness on percussion and absence of breath sounds in the right lower lung field. A chest x-ray demonstrates pleural fluid on the right side. Thoracentesis returns a thick, foul-smelling fluid. Which of the following is the most likely diagnosis?

a. Chylothorax
b. **Empyema**
c. Hemothorax
d. Hydrothorax
e. Pneumothorax

66. A 28-year-old woman with cystic fibrosis presents with increasing shortness of breath and production of abundant foul-smelling sputum. The sputum in this patient is most likely associated with which of the following pulmonary conditions?

a. Atelectasis
b. **Bronchiectasis**
c. Empyema
d. Pneumothorax
e. Pyothorax

67. A 53-year-old man develops weakness, malaise, cough with bloody sputum, and night sweats. A chest x-ray reveals numerous apical densities bilaterally, some of which are cavitary. Exposure to *Mycobacterium tuberculosis* was documented 20 years ago, and *M. tuberculosis* is identified in his sputum. Which of the following describes the expected lung pathology in this patient?

a. Dense fibrosis
b. Eosinophilic infiltration
c. **Granulomas**
d. Interstitial pneumonia
e. Plasma cell infiltration

68. A 22-year-old man with AIDS complains of persistent cough, night sweats, low-grade fever, and general malaise. A chest x-ray reveals an area of consolidation in the periphery of the left upper lobe, as well as hilar lymphadenopathy. Sputum cultures show acid-fast bacilli. Which of the following is the most likely diagnosis?
69. A 60-year-old alcoholic woman presents to the emergency room with fever, chills, and shortness of breath. The sputum is rusty-yellow and contains numerous neutrophils, red blood cells, and gran-positive cocci. A chest x-ray shows diffuse haziness over both lungs. One week following admission, the patient develops empyema. This pulmonary condition is associated with the spread of bacterial infection to which of the following anatomic locations?

a. Blood  
b. Bronchi  
c. Interstitial space  
d. Pericardium  
e. Pleural space

70. A 40-year-old woman with leukemia is treated with chemotherapy. During treatment she develops increasing cough and shortness of breath. A chest x-ray shows diffuse lung infiltrates. Sputum cultures are negative, and the patient does not respond to routine antibiotic therapy. An open lung biopsy is diagnosed by the pathologist as viral pneumonia. Which of the following histopathologic findings would be expected in the lungs of this patient?

a. Clusters of epithelioid macrophages  
b. Confluent areas of caseous necrosis  
c. Fibrous scarring of lung parenchyma  
d. Hyaline membranes and interstitial inflammation  
e. Sheets of bacilli-filled macrophages

71. Squamous metaplasia occur typically in:

A. bronchi of chronic smokers.  
B. skin exposed to sunlight.  
C. a callus  
D. Barrett esophagus  
E. chronic gastritis

72. Which of the following pathologic processes is an example of dysplasia?

A. Actinic keratosis  
B. Chronic gastritis  
C. Chronic bronchitis  
D. Ulcerative colitis  
E. Barrett esophagus
73. All the following are signs of necrosis except:
   A. Lipofuscin
   B. Pyknosis
   C. Karyolysis
   D. Karyorrhexis
   E. Cell membrane rupture

74. Enzymatic necrosis affecting the pancreas is called:
   A. Coagulative necrosis
   B. Liquefactive necrosis
   C. Fat necrosis
   D. Caseous necrosis
   E. Fibrinoid necrosis.

75. Metastatic calcification is seen in:
   A. Vitamin A deficiency.
   B. Vitamin D deficiency
   C. Hypermagnesium.
   D. Hypothyroidism
   E. Heart failure.

76. Foreign-body giant cells are derived from:
   A. Lymphocytes
   B. Macrophages
   C. Basophils
   D. Eosinophils
   E. Mast cells

77. Parasitic infestations typically provoke:
   A. Leukopenia
   B. Neutrophilia
   C. Eosinophilia
   D. Lymphocytosis
   E. Lymphopenia.
78. Caseating granulomas are typical of a reaction to:

A. Viruses
B. Mycobacterium tuberculosis
C. Parasites
D. Pyogenic bacteria
E. Foreign bodies

79. The replacement of dead cells cannot occur by regeneration in tissues composed of:

A. Labile cells
B. Stable cells
C. Permanent cells
D. Stem cells
E. Embryonic cells

80. Regeneration typically occurs in all the following tissues except:

A. Epidermis
B. Liver
C. Adrenal glands
D. Kidney
E. Lens

81. Factors that retard the healing of wounds include all the following except:

A. Infection
B. Ultraviolet light
C. Lack of immobilization
D. Diabetes mellitus
E. Exogenous corticosteroids

82. Macrophages secrete all the following except:

A. Interleukin – 1
B. Tumor necrosis factor
C. Arachidonic acid derivatives
D. Plasminogen activator
E. Kappa chains of immunoglobulins
83. All the following conditions represent a type II hypersensitivity reaction except:
   A. Autoimmune hemolytic anemia
   B. Myasthenia gravis
   C. Transfusion reaction
   D. Graves disease
   **E. Hay fever**

84. Immune complex-mediated (type III hypersensitivity) reaction causes tissue lesions in:
   A. **Polyarteritis nodosa**
   B. Pemphigus vulgaris
   C. Bullous pemphigoid
   D. Poisin ivy reaction
   E. Chronic renal graft rejection.

85. Adenocarcinoma of the colon **B**
86. Islet cell carcinoma of the pancreas **C**
87. Leiomyoma **F**
88. Hepatocellular carcinoma **A**
89. Yolk sac carcinoma of the ovary **A**
   A. $\alpha$-fetoprotein (AFP)
   B. Carcinoembryonic antigen (CEA)
   C. Chromogranin
   D. Chorionic gonadotropin (hCG)
   E. Coagulation factor VIII
   F. Desmin
   G. Glial fibrillary acidic protein
   H. Immunoglobulin
   I. Leukocyte common antigen

90. Common symptom of acute cystitis. **K**
91. A common crippling feature of hemophilia. **I**
92. Complication of myocardial infarction that may cause a stroke. **T**
93. Characterized by multiple, dot-sized hemorrhages in the brain 3-5 days following fracture of the humerus. **H**

94. Common symptom of cavitary pulmonary tuberculosis. **O**

95. Black stools in a patient with a chronic bleeding duodenal ulcer. **P**

96. Complication of nose-picking. **G**

97. A potentially lethal complication of cirrhosis. **J**

98. Confluent skin hemorrhages around the eye ("black eye"). **S**

99. Accounts for the abdominal swelling in patients with cirrhosis. **C**

100. Generalized edema in a baby born with maternal-fetal Rh incompatibility. **B**

101. Feature of the nephrotic syndrome. **B**

102. Symptom of thrombocytopenia. **S**

103. Symptom of hypersensitivity vasculitis involving small blood vessels of the skin. **S**

104. Associated with septic shock, multiple organ failure, and microthrombi in capillaries, arterioles and venules. **E**

105. Typical symptom of rectal carcinoma. **M**

106. Central nervous system complication of the neonatal respiratory distress syndrome in prematurely born infants. **L**

107. May be symptom of septic abortion. **R**

108. Heavy vaginal bleeding every 4 weeks in a 40-year-old woman, lasting 4-5 days. **Q**

109. Blushing in a shy person. **A**

110. Associated with hemosiderin-laden macrophages (heart failure cells) in lungs of patients with left ventricular failure. **D**

A. Active hyperemia
B. Anasarca
C. Ascites
D. Chronic passive congestion
E. Disseminated intravascular coagulation
F. Ecchymosis
G. Epistaxis
H. Fat embolism
I. Hemarthrosis
J. Hematemesis
K. Hematuria  
L. Hematocephalus  
M. Hematochezia  
N. Hematoma  
O. Hemoptysis  
P. Melena  
Q. Menorrhagia  
R. Metrorrhagia  
S. Purpura  
T. Thromboembolism

111. A complication of infectious mononucleosis is:
   A. Burkitt lymphoma  
   B. Cerebral abscess.  
   C. **Rupture of the spleen**  
   D. Cirrhosis of the liver  
   E. Gonadal atrophy

112. A 30-year old woman suffers traumatic injury to her breast while playing soccer. Physical examination reveals a 3-cm area of ecchymosis on the left breast. Two weeks later, the patient palpates a firm lump beneath the area where the bruise had been located. Which of the following is the most likely pathologic diagnosis?
   (A) Duct ectasia  
   (B) **Fat necrosis**  
   (C) Fibrocystic change  
   (D) Granulomatous mastitis  
   (E) Intraductal papillomatosis

113. A 50-year old woman presents with a mass in her left breast that she first detected 6 month earlier. A firm 4-cm mass is palpated on breast examination. Exscisional biopsy reveals malignant cuboidal cells that form gland-like structures and solid nests, surrounded by dense collagenous stroma. Which of the following terms best describes the adoptive response of this patient’s normal breast tissue to the tumor?
   (A) Anaplasia  
   (B) **Desmoplasia**  
   (C) Fibrinolysis  
   (D) Lipohyalinosis  
   (E) Metaplasia
114. Cloudy swelling is due to an increase in intracellular

(A) calcium
(B) endoplasmic reticulum
(C) lipid
(D) potassium
(E) water

115. Hydropic degeneration of the renal tubular epithelium occurs in

(A) chronic alcoholism
(B) carbon tetrachloride poisoning
(C) excessive renal sodium loss
(D) hypokalemia
(E) mercury poisoning

116. The lipid in hepatic cells in fatty degeneration is mainly in the form of

(A) cholesterol esters
(B) fatty acids
(C) lipoproteins
(D) phospholipids
(E) triglycerides

117. Urethral obstruction of long standing due to prostatic enlargement leads to which of the following changes in the urinary bladder muscularis?

(A) atrophy
(B) dysplasia
(C) hyperplasia
(D) hyperthrophy
(E) metaplasia

118. Urethral obstruction of long standing leads to which of the following pathological changes in the kidneys?

(A) atrophy
(B) dysplasia
(C) hyperplasia
(D) hyperthrophy
(E) metaplasia

In items 119-122 match each disorder with the type of necrosis typically associated with it.

(A) caseation necrosis
(B) coagulation necrosis
119. obstruction of arterial blood supply  A
120. leakage of pancreatic enzymes  C
121. histoplasmosis  A
122. infarct of cerebrum  E

123. Metastatic calcification results from

(A) fat necrosis
(B) fracture of a bone
(C) **hypercalcemia**
(D) malignant neoplasia
(E) miliary tuberculosis

124. In a patient with chronic right ventricular failure, the usual pathologic change which occurs in the liver is

(A) acute inflammation
(B) **congestion**
(C) edema
(D) hemorrhage
(E) infarction

125. The basic causes of edema include all of the following EXCEPT:

(A) increased capillary blood pressure
(B) increased permeability of capillaries and venules
(C) **increased plasma osmotic pressure**
(D) obstruction of lymph flow
(E) sodium retention by the kidneys

126. A teenage boy has episodes of swelling of the upper lip and abdominal pain. There is a family history of angioneurotic edema. The defect underlying the episodes is

(A) abnormal sensitivity to histamine
(B) deficiency of C’1 esterase inhibitor
(C) excessive degranulation of mast cells by C’5a
(D) hypersensitivity to kinins
(E) membrane damage by C’56789

127. Platelet aggregation at the site of blood vessel injury is initiated by
(A) activation of Hageman factor
(B) contact of platelets with subendothelial collagen
(C) lysosomal enzymes from neutrophils
(D) release of tissue thromboplastin
(E) thrombin

128. Causes of increased tendency to thrombosis include all of the following EXCEPT:

(A) aspirine abuse
(B) atherosclerosis
(C) increased blood viscosity
(D) pancreatic carcinoma
(E) use of an intravascular catheter

129. When a left ventricular mural thrombus develops, infarction may result in all of the following EXCEPT:

(A) cerebrum
(B) kidneys
(C) lungs
(D) small intestine
(E) spleen

In items 130-133, match each disorder with the type of embolism tipically associated with it

(A) air embolism
(B) fat embolism
(C) paradoxical embolism
(D) septic embolism
(E) talc embolism

130. acute bacterial endocarditis D
131. fracture of bone B
132. interventricular septal defect C
133. intravenous drug use E

134. The impaction of a coagulum of blood in a vessel at a point beyond which it cannot pass is

(A) congestion
(B) embolism
(C) hemorrhage
(D) infarction
(E) thrombosis

135. Hemorrhagic infarction characteristically occurs in the

(A) kidney
(B) liver
(C) lungs
136. The process by which inflammatory cells are positively attached to a focus of tissue injury is

(A) anaphylaxis  
(B) **chemotaxis**  
(C) complement fixation  
(D) migration  
(E) phagocytosis

137. Digestion of foreign material by a neutrophil or macrophage during phagocytosis is mainly due to

(A) complement  
(B) hydrogen peroxide  
(C) kinins  
(D) **lysosomal enzymes**  
(E) thrombin

138. A mayor cause of pain in foci of acute inflammation is

(A) bradykinin  
(B) complement  
(C) histamine  
(D) hydrogen peroxide  
(E) superoxide

139. A 1 year old boy had a frequent infection due to *Staphylococcus aureus*. NADPH oxidase activity in his neutrophils was absent, and \( \text{H}_2\text{O}_2 \) was not formed. The most likely diagnosis is

(A) **Chediak-Higashi syndrome**  
(B) chronic granulomatous disease  
(C) Job’s syndrome  
(D) lazy leukocyte syndrome  
(E) myeloperoxidase deficiency

140. Granulomatous inflammation is characteristic of all of the following **EXCEPT**

(A) berylliosis  
(B) foreign body reaction  
(C) fungus unfection  
(D) leprosy  
(E) **pertussis**
141. The phenomenon which most definitely indicates that a neoplasm is malignant is

(A) autonomous cell proliferation
(B) central necrosis
(C) lack of encapsulation
(D) metastasis
(E) painfulness

142. All the following chemicals are carcinogens EXCEPT

(A) asbestos
(B) aspartame
(C) benzpyrene
(D) methylcholantrene
(E) vinyl chlorid

143. Pathologic changes or clinical manifestations which occur in patients with primary hemochromatosis include all of the following EXCEPT

(A) congestive heart failure
(B) diabetes mellitus
(C) hepatocarcinoma
(D) photosensitivity dermatitis
(E) testicular atrophy

144. All of the following are characteristically found in cases of ochronosis EXCEPT

(A) alkaptonuria
(B) arthritis
(C) deposition of melanine like pigment
(D) photosensitivity
(E) recessively transmitted inheritance

145. All of the following are features of fetal alcohol syndrome EXCEPT

(A) abnormally low body weight
(B) hirsutism
(C) interventricular septal defect
(D) mental deficiency
(E) microphthalmus (small eyes)

In items 146 to 153, match each item with the poison most closely related to it

(A) carbon monoxide
(B) cyanide  
(C) ethylene glycol  
(D) heroin  
(E) inorganic mercury  
(F) lead  
(G) lye  
(H) methyl alcohol  
(I) organic phosphates  
(J) salicylates

146. acid-fast intranuclear inclusions in kidneys

147. calcium oxalate crystals in kidneys

148. blockage of cytochrome oxidase system

149. decreased $O_2$-carrying capacity of erythrocytes

150. decreased cholinesterase activity in erythrocytes

151. esophageal stricture

152. increased urinary coproporphyrin level

153. pulmonary edema with frothy fluid from nostrils

154. A diabetic patient develop a carbuncle. Aspirated pus grew out Staphylococcus aureus. Hematogenous complications of such a staphylococcal infection include all of the following EXCEPT:

(A) endocarditis  
(B) hepatitis  
(C) lung abscesses  
(D) osteomyelitis  
(E) pyelonephritis

155. The exotoxin produced by Corynebacterium diphteriae causes pathologic changes in all of the following EXCEPT:

(A) myocardium  
(B) pharynx  
(C) peripheral nerves  
(D) skeletal muscles  
(E) trachea
156. Ulcers of the ileum over enlarged Peyer's patches are characteristic finding in

(A) Salmonella gastroenteritis  
(B) Shigella dysentery  
(C) staphylococcal gastroenteritis  
(D) tuberculosis of the intestine  
(E) **typhoid fever**

157. The finding of caseatig granulomas in a tissue section is specifically diagnostic of

(A) histoplasmosis  
(B) leprosy  
(C) sarcoidosis  
(D) **tuberculosis**  
(E) none of the above

158. In acquired immunodeficiency syndrome (AIDS) the immune defect is due to a

(A) **depletion of CD4-helper T lymphocytes**  
(B) depletion of CD8-cytotoxic T lymphocytes  
(C) failure of B lymphocytes to mature to plasma cells  
(D) failure of pre-B lymphocytes to mature  
(E) lymphoid stem cell defect

159. The underlaying cause of kwashiorkor is a

(A) high carbohydrate diet  
(B) low calorie diet  
(C) low fat diet  
(D) **low protein diet**  
(E) multiple vitamin deficiencies

160. Typical lesions in acute rheumatic fever include all of the following EXCEPT:

(A) erythema marginatum  
(B) polyarthritis  
(C) poststreptococcal glomerulonephritis  
(D) subcutaneous nodules  
(E) **verrucae on mitral valve**

161. A 32-year-old woman with poorly controlled diabetes mellitus delivers a healthy boy at 38 weeks of gestation. As a result of maternal hyperglycemia during pregnancy, pancreatic islets in the neonate would be expected to show which of the following morphologic responses to injury?

(A) **Atrophy**
162. A 52-year-old woman loses her right kidney following an automobile accident. A CT scan of the abdomen 2 years later shows marked enlargement of the left kidney. The renal enlargement is an example of which of the following adaptations?

(A) Atrophy
(B) Dysplasia
(C) Hyperplasia
(D) Hypertrophy
(E) Metaplasia

163. A 60-year-old man with chronic cystitis complains of urinary frequency and pelvic discomfort. Digital rectal examination is unremarkable. Biopsy of the bladder mucosa reveals foci of glandular epithelium and chronic inflammatory cells. No cytologic signs of atypia or malignancy are observed. Which of the following terms best describes the morphologic response to chronic injury in this patient?

(A) Atrophy
(B) Dysplasia
(C) Hyperplasia
(D) Hypertrophy
(E) Metaplasia

164. A 22-year-old construction worker sticks himself with a sharp, rusty nail. Within 24 hours, the wound has enlarged to become a 1-cm sore that drains thick, purulent material. This skin wound illustrates which of the following morphologic types of necrosis?

(A) Caseous necrosis
(B) Coagulative necrosis
(C) Fat necrosis
(D) Fibrinoid necrosis
(E) Liquefactive necrosis

165. A 56-year-old woman with a history of hyperlipidemia and hypertension develops progressive, right renal artery stenosis. Over time, this patient’s right kidney is likely to demonstrate which of the following morphologic adaptations to partial ischemia?

(A) Atrophy
(B) Dysplasia
(C) Hyperplasia
(D) Hypertrophy
166. A 59-year-old woman smoker complains of intermittent blood in her urine. Urinalysis confirms 4+ hematuria. A CBC reveals increased red cell mass (hematocrit). A CT scan demonstrates a 3-cm renal mass, and a CT-guided biopsy displays renal cell carcinoma. Which of the following cellular adaptations in the bone marrow best explains the increased hematocrit in this patient?

(A) Atrophy  
(B) Dysplasia  
(C) Hyperplasia  
(D) Hypertrophy  
(E) Metaplasia

167. A 60-year-old farmer presents with multiple patches of discoloration on his face. Biopsy of lesional skin reveals actinic keratosis. Which of the following terms best describes this response of the skin to chronic sunlight exposure?

(A) Atrophy  
(B) Dysplasia  
(C) Hyperplasia  
(D) Hypertrophy  
(E) Metaplasia

168. A 32-year-old woman develops an Addisonian crisis (acute adrenal insufficiency) 3 months after suffering massive hemorrhage during the delivery of her baby. A CT scan of the abdomen shows small adrenal glands. Which of the following mechanisms of disease best accounts for adrenal atrophy in this patient?

(A) Chronic inflammation  
(B) Chronic ischemia  
(C) Hemorrhagic necrosis  
(D) Lack of trophic signals  
(E) Tuberculosis

169. A 20-year-old man from China is evaluated for persistent cough, night sweats, low-grade fever, and general malaise. A chest X-ray reveals findings “consistent with a Ghon complex.” Sputum cultures grow acid-fast bacilli. Examination of hilar lymph nodes in this patient would most likely demonstrate which of the following pathologic changes?

(A) Caseous necrosis  
(B) Coagulative necrosis  
(C) Fat necrosis  
(D) Fibrinoid necrosis  
(E) Liquefactive necrosis
170. A 22-year-old woman nursing her newborn develops a tender erythematous area around the nipple of her left breast. A thick, yellow fluid is observed to drain from an open fissure. Examination of this breast fluid under the light microscope will most likely reveal an abundance of which of the following inflammatory cells?

(A) B lymphocytes  
(B) Eosinophils  
(C) Mast cells  
(D) Neutrophils  
(E) Plasma cells

171. A 36-year-old woman with pneumococcal pneumonia develops a right pleural effusion. The pleural fluid displays a high specific gravity and contains large numbers of polymorphonuclear (PMN) leukocytes. Which of the following best characterizes this pleural effusion?

(A) Fibrinous exudate  
(B) Lymphedema  
(C) Purulent exudate  
(D) Serosanguineous exudate  
(E) Transudate

172. A 5-year-old boy punctures his thumb with a rusty nail. Four hours later, the thumb appears red and swollen. Initial swelling of the boy’s thumb is primarily due to which of the following mechanisms?

(A) Decreased intravascular hydrostatic pressure  
(B) Decreased intravascular oncotic pressure  
(C) Increased capillary permeability  
(D) Increased intravascular oncotic pressure  
(E) Vasoconstriction of arterioles

173. A 33-year-old man presents with a 5-week history of calf pain and swelling and low-grade fever. Serum levels of creatine kinase are elevated. A muscle biopsy reveals numerous eosinophils. What is the most likely etiology of this patient’s myalgia?

(A) Autoimmune disease  
(B) Bacterial infection  
(C) Muscular dystrophy  
(D) Parasitic infection  
(E) Viral infection

174. A 62-year-old woman undergoing chemotherapy for breast cancer presents with a 3-day history of fever and chest pain. Cardiac catheterization reveals a markedly reduced ejection fraction with normal coronary blood flow. A myocardial
biopsy is obtained, and a PCR test for coxsackievirus is positive. Histologic examination of this patient’s myocardium will most likely reveal an abundance of which of the following inflammatory cells?

(A) Eosinophils
(B) Lymphocytes
(C) Macrophages
(D) Mast cells
(E) Neutrophils

175. A 25-year-old machinist is injured by a metal sliver in his left hand. Over the next few days, the wounded area becomes reddened, tender, swollen, and feels warm to the touch. Redness at the site of injury in this patient is caused primarily by which of the following mechanisms?

(A) Hemorrhage
(B) Hemostasis
(C) Neutrophil margination
(D) Vasoconstriction
(E) Vasodilation

176. A 28-year-old woman cuts her hand while dicing vegetables in the kitchen. The wound is cleaned and sutured. Five days later, the site of injury contains an abundance of chronic inflammatory cells that actively secrete interleukin-1, tumor necrosis factor-α, interferon-α, numerous arachidonic acid derivatives, and various enzymes. Name these cells.

(A) B lymphocytes
(B) Macrophages
(C) Plasma cells
(D) Smooth muscle cells
(E) T lymphocytes

177. A 50-year-old woman is discovered to have metastatic breast cancer. One week after receiving her first dose of chemotherapy, she develops bacterial pneumonia. Which of the following best explains this patient’s susceptibility to bacterial infection?

(A) Depletion of serum complement
(B) Impaired neutrophil respiratory burst
(C) Inhibition of clotting factor activation
(D) Lymphocytosis
(E) Neutropenia

178. A 68-year-old coal miner with a history of smoking and emphysema develops severe air-flow obstruction and expires. Autopsy reveals a “black lung,” with coal-dust nodules scattered throughout the parenchyma and a central area of
dense fibrosis. The coal dust entrapped within this miner’s lung was sequestered primarily by which of the following cells?

(A) Endothelial cells  
(B) **Fibroblasts**  
(C) Lymphocytes  
(D) Macrophages  
(E) Plasma cells

179. A 74-year-old woman presents with acute chest pain and shortness of breath. Cardiac catheterization demonstrates occlusion of the left anterior descending coronary artery. Laboratory studies and ECG are consistent with acute myocardial infarction. Which of the following is the most likely pathologic finding in the affected heart muscle 4 weeks later?

(A) Capillary-rich granulation tissue  
(B) **Collagen-rich scar tissue**  
(C) Granulomatous inflammation  
(D) Neutrophils and necrotic debris  
(E) Vascular congestion and edema

180. A 68-year-old man presents for repair of an abdominal aortic aneurysm. Severe complicated atherosclerosis is noted at surgery, prompting concern for embolism of atheromatous material to the kidneys and other organs. If the patient were to develop a renal cortical infarct as a result of surgery, which of the following would be the most likely outcome?

(A) Chronic inflammation  
(B) Granulomatous inflammation  
(C) Hemangioma formation  
(D) Repair and regeneration  
(E) **Scar formation**

181. A 34-year-old woman has a benign nevus removed from her back under local anesthesia. Which of the following families of cell adhesion molecules is the principal component of the “provisional matrix” that forms during early wound healing?

(A) Cadherins  
(B) **Fibronectins**  
(C) Integrins  
(D) Laminins  
(E) Selectins

182. A 30-year-old firefighter suffers extensive third-degree burns over his arms and hands. This patient is at high risk for developing which of the following complications of wound healing?

(A) **Contracture**
183. A 35-year-old man asks for advice regarding seasonal eye itching and runny nose. Recurrent conjunctivitis in this patient is most likely caused by which of the following mechanisms of disease?

(A) Autoimmunity  
(B) Bacterial infection  
(C) Chemical toxicity  
(D) **Hypersensitivity**  
(E) Viral infection

184. During the physical examination of a 22-year-old man, a purified protein derivative isolated from *Mycobacterium tuberculosis* is injected into the skin. Three days later, the injection site appears raised and indurated. Which of the following glycoproteins was directly involved in antigen presentation during the initiation phase of delayed hypersensitivity in this patient?

(A) CD4  
(B) CD8  
(C) Class I HLA molecules  
(D) Class II HLA molecules  
(E) GlyCAM-1

185. A 31-year-old man with AIDS complains of difficulty swallowing. Examination of his oral cavity demonstrates whitish membranes covering much of his tongue and palate. Endoscopy also reveals several whitish, ulcerated lesions in the esophagus. These pathologic findings are fundamentally caused by loss of which of the following immune cells in this patient?

(A) B lymphocytes  
(B) **Helper T lymphocytes**  
(C) Killer T lymphocytes  
(D) Monocytes/macrophages  
(E) Natural killer (NK) cells

186. An 80-year-old man complains of lower abdominal pain, increasing weakness, and fatigue. He has lost 16 lb (7.3 kg) in the past 6 months. The prostate-specific antigen test is elevated (8.5 ng/mL). Rectal examination reveals an enlarged and nodular prostate. A needle biopsy of the prostate discloses invasive prostatic adenocarcinoma. Histologic grading of this patient’s carcinoma is based primarily on which of the
187. During a routine checkup, a 50-year-old man is found to have blood in his urine. He is otherwise in excellent health. An abdominal CT scan reveals a 2-cm right renal mass. You inform the patient that staging of this tumor is key to selecting treatment and evaluating prognosis. Which of the following is the most important staging factor for this patient?

(A) Histologic grade of the tumor  
(B) Metastases to regional lymph nodes  
(C) Proliferative capacity of the tumor cells  
(D) Somatic mutations in the p53 tumor suppressor gene  
(E) Tumor cell karyotype (aneuploidy)

188. A 50-year-old alcoholic is rushed to the hospital with bleeding esophageal varices and expires. At autopsy, the patient’s protruding abdomen is found to contain a large volume of serous fluid. What is the appropriate term used to describe this fluid?

(A) Ascites  
(B) Exudate  
(C) Hemorrhage  
(D) Hydrothorax  
(E) Lymphedema

189. A 23-year-old man with hemophilia is recently wheelchair bound. Which of the following best accounts for this development?

(A) Hemarthrosis  
(B) Hematemesis  
(C) Hematocephalus  
(D) Hematochezia  
(E) Hemoptysis

190. A 20-year-old man is brought to the emergency room after rupturing his spleen in a motorcycle accident. His blood pressure on admission is 80/60 mm Hg. Analysis of arterial blood gasses demonstrates metabolic acidosis. This patient is most likely suffering from which of the following conditions?

(A) Acute pancreatitis  
(B) Cardiogenic shock  
(C) Hypersplenism
191. A 50-year-old woman appears at your office. She was subjected to radical mastectomy and axillary node dissection for breast cancer a year ago. She now notices that her arm becomes swollen by the end of the day. What is the appropriate name for this fluid accumulation?

(A) Chylothorax
(B) Hydrothorax
(C) Lymphedema
(D) Purulent exudate
(E) Fibrinous exudate

192. A 47-year-old man presents with a 6-week history of increasing fatigue and dark-colored stools. Complete blood count shows hemoglobin of 8.6 g/dL and microcytic, hypochromic RBCs. Upper gastrointestinal endoscopy reveals a peptic ulcer along the lesser curvature of the stomach. This patient’s anemia is most likely caused by deficiency of which of the following?

(A) Folic acid
(B) Iron
(C) Thiamine
(D) Vitamin B12
(E) Zinc

193. A 26-year-old electrician is found unconscious in his backyard beside a metal ladder and an exposed electrical wire, suffering from a deep burn on his right hand. Resuscitation attempts are unsuccessful. Which of the following was the most likely cause of death?

(A) Cardiac arrhythmia
(B) Disseminated intravascular coagulation
(C) Myocardial infarction
(D) Rupture of the ascending aorta
(E) Uncoupling of oxidative phosphorylation

194. A 40-year-old, malnourished woman presents with a 6-month history of night blindness. Physical examination reveals keratomalacia and corneal ulceration. Which of the following vitamin deficiencies would be suspected in this patient?

(A) Vitamin A
(B) Vitamin B2 (riboflavin)
(C) Vitamin C
(D) Vitamin E
(E) Folic acid
195. A 52-year-old, obese man (BMI = 34 kg/m²) presents to his physician with complaints of hoarseness for 2 months. He has worked in a chemical factory for 25 years and gives a history of smoking, consumption of one or two beers a day, and occasional use of illicit drugs. Physical examination reveals enlarged and firm cervical lymph nodes. Direct laryngoscopy reveals a fixed and enlarged left vocal cord, which appears ulcerated. A biopsy of the lesion is interpreted by the pathologist as squamous cell carcinoma. What is the most likely cause of this man’s disease?

(A) Alcohol
(B) Benzene inhalation
(C) **Cigarette smoking**
(D) Cocaine use
(E) High-fat diet

196. A 19-year-old woman presents with vague lower abdominal pain and a swollen, painful right knee. She denies any trauma to the knee or history of arthritic disorders. Physical examination reveals an enlarged joint that is red, warm, and painful. Pelvic examination is exquisitely painful and reveals an ill-defined thickening in both adnexae. A green-yellow purulent vaginal discharge is noted. The patient is febrile and has an elevated WBC count of 15,000/L. Which of the following etiologic agents is most likely responsible for this patient’s condition?

(A) *Escherichia coli*
(B) *Neisseria gonorrhoeae*
(C) *Streptococcus pyogenes*
(D) *Treponema pallidum*
(E) *Yersinia pestis*

197. A 65-year-old man undergoes cardiac bypass surgery and is placed on postoperative, broad-spectrum, antibiotic prophylaxis. Several days later, he develops fever, abdominal pain, and bloody diarrhea. Colonoscopic biopsy demonstrates a thick mucopurulent exudate. Which of the following is the most likely etiology of this patient’s gastrointestinal disorder?

(A) *Clostridium botulinum*
(B) *Clostridium difficile*
(C) *Clostridium perfringens*
(D) *Clostridium tetani*
(E) *Escherichia coli 0157-H7*

198. A 45-year-old man presents with chest pain, fever, productive cough, and rust-colored sputum. The patient was diagnosed with tuberculosis in his early 20s. A chest X-ray shows multiple, nodular infiltrates and cavitary lesions. A lung biopsy
reveals necrotizing inflammation and vascular thrombi with branching fungal hyphae. Which of the following is the most likely diagnosis?

(A) Actinomycosis  
(B) **Aspergillosis**  
(C) Candidiasis  
(D) Cryptococcosis  
(E) Histoplasmosis

199. A 5-year-old boy is brought to the emergency room with a fever of 103°F (38.7°C), chest pain, and productive cough. The patient has a history of recurrent pulmonary disease and respiratory distress. What microorganism recovered from the lungs of this child is virtually diagnostic of cystic fibrosis?

(A) *Klebsiella* sp.  
(B) *Legionella* sp.  
(C) *Pneumocystis* sp.  
(D) *Pseudomonas* sp.  
(E) *Streptococcus* sp.

200. A 48-year-old man with a longstanding history of chronic constipation complains of anal itching and discomfort toward the end of the day. He describes a perianal pain when sitting and finds himself sitting sideways to avoid discomfort. Physical examination reveals painful varicose dilations in the anal region, associated with edema. Which of the following is the most likely diagnosis?

(A) Anal cancer  
(B) Anal fissure  
(C) **Hemorrhoids**  
(D) Ischiorectal abscess  
(E) Rectal cancer