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Exam I

Monday, September 25, 2000; 8–9:50 a.m.

**PHOTO QUESTIONS**

Photo question 1 (2 photos)

1. This lesion appeared on the ear lobe after ear piercing. It is
  - A. an example of healing by first intention
  - B. an example of healing by second intention
  - C. a foreign body reaction
  - D. a keloid
  - E. an ulcer

Photo question 2 (2 photos)

2. Which organism is the most likely etiologic agent?
  - A. Coccidioides immitis
  - B. Type A influenza virus
  - C. Streptococcus pneumoniae
  - D. Histoplasma capsulatum
  - E. Rhinovirus

Photo question 3 (1 photo)

3. This section of thyroid shows
  - A. A lymphocytic infiltrate
  - B. An eosinophilic infiltrate
  - C. A granulomatous infiltrate
  - D. Granulation tissue
  - E. Acute inflammation

Photo question 4 (2 photos)

4. These photographs show
  - A. fat necrosis
  - B. caseous necrosis
  - C. liquefactive necrosis
  - D. coagulative necrosis
  - E. granulation tissue

Photo question 5 (1 photo)

5. This photograph of kidney shows an example of
  - A. physiologic hyperplasia
  - B. irreversible injury
  - C. atrophy
  - D. reversible injury
  - E. dystrophic calcification

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**SELECT THE ONE BEST ANSWER.**

6. Which of the following is an important cause of childhood infectious diarrhea?
- A. Cryptococcus neoformans
  - B. Rhinovirus
  - C. Paramyxovirus
  - D. Rotavirus
  - E. Papillomavirus
7. Which of the following explains the findings seen in tetanus?
- A. autoantibodies to acetylcholine stimulate neuronal activity
  - B. autoantibodies to acetylcholine inhibit neuronal activity
  - C. preformed neurotoxin blocks release of acetylcholine leading to descending paralysis and finally respiratory paralysis
  - D. organism spores germinate, elaborate neurotoxin that blocks inhibitory neurons leading to contractions of voluntary muscles
  - E. proliferating organisms elaborate exotoxin that causes epithelial necrosis and damages myocardium and nerves
8. A 3 year old child of migrant farm workers is brought to the emergency room with a high fever. You immediately detect a soft inspiratory stridor, drooling, and see the child sitting in a “sniffing dog” position. With the help of an interpreter, you discover the child received some immunizations, but the parents do not remember specifically which ones. Highest on your differential diagnoses is
- A. acute epiglottitis
  - B. epidemic typhus
  - C. varicella
  - D. whooping cough
  - E. typhoid fever
9. A 3 year old child is brought to clinic with a 12 day history of a “cold” and 2 day history of fever up to 103.2 F. You perform a complete physical examination and explain to the mother that the child has a common complication of a childhood cold,
- A. acute epiglottitis.
  - B. otitis media.
  - C. infective endocarditis.
  - D. whooping cough.
  - E. shingles.

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10. A 63 year old male presents to the emergency room complaining of hemoptysis. Further questioning reveals a 3 month history of fever, cough, night sweats, and a 17 lb weight loss. A chest radiograph reveals a cavitary lesion in the apex of the left lung, and hilar lymphadenopathy. The most likely diagnosis is
- A. primary tuberculosis
  - B. pneumonic anthrax
  - C. mucormycosis
  - D. Pseudomonas pneumonia
  - E. secondary tuberculosis
11. The chancre, the gumma, endarteritis obliterans, and condyloma lata are lesions associated with
- A. Syphilis
  - B. Syphillus
  - C. Syphillis
  - D. Syphilus
  - E. siphylis
12. The majority of pulmonary emboli originate in
- A. The heart
  - B. The deep veins of the lower extremity
  - C. The lungs
  - D. The gastrointestinal tract
  - E. The brain
13. Which is/are involved in the pathogenesis of thrombosis
- A. Endothelial damage
  - B. Turbulence/Stasis
  - C. Increased coagulability of blood
  - D. All of the above
  - E. None of the above
14. Which of the following is most closely associated with paradoxical emboli?
- A. diabetes mellitus
  - B. hypertension
  - C. atrial septal defect
  - D. pulmonary edema
  - E. congestive splenomegaly

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15. All of the following are true of antigen recognition by CD4+ T cells **EXCEPT**:
- A. The T cell receptor recognizes a peptide fragment of antigen bound to the MHC class II molecule.
  - B. The CD4 molecule binds to the nonpolymorphic portion of the Class II molecule.
  - C. The interaction between the TCR and the MHC-bound antigen provides signal 1 for T cell activation.
  - D. Signal 2 is provided by the interaction of the CD28 molecule with the co-stimulatory molecules B7-1 and B7-2 on antigen-presenting cells.
  - E. Immunologic tolerance follows stimulation of both signal 1 and signal 2, whereas signal 1 alone leads to lymphocyte activation.
16. NK cells kill tumor cells or virus-infected cells because:
- A. Reduced expression of MHC Class I molecules by target cells interrupts inhibitory signals.
  - B. Increased expression of MHC Class II molecules by target cells activates NK cells.
  - C. Reduced expression of MHC Class III molecules by target cells enhances NK cell killing.
  - D. Decreased expression of adhesion molecules enhances NK cell killing.
  - E. Increased expression of MHC Class I molecules promotes NK cell killing.
17. Secondary mediators of Type I hypersensitivity include all of the following **EXCEPT**:
- A. Prostaglandin D<sub>2</sub>
  - B. Cytokines
  - C. Leukotrienes
  - D. Platelet-activating factor
  - E. Proteoglycans
18. The “stimulatory” variety of Type II anti-receptor hypersensitivity may be associated with:
- A. Hashimoto’s thyroiditis
  - B. Graves’ disease
  - C. Contact dermatitis
  - D. Myasthenia gravis
  - E. Anaphylaxis
19. Complement-antibody induced lysis, opsonization, antibody-dependent cell-mediated cytotoxicity and anti-receptor antibodies are all mechanisms involved in:
- A. Type IV hypersensitivity
  - B. Type I hypersensitivity
  - C. Type II hypersensitivity
  - D. Type III hypersensitivity
  - E. Granulomatous hypersensitivity

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20. Diseases or reactions with a type IV mechanism of hypersensitivity include all of the following **EXCEPT**:
- A. Histoplasmosis
  - B. Contact dermatitis
  - C. Transplant rejection
  - D. Goodpasture's syndrome
  - E. Tuberculosis
21. Autoimmune diseases may result from all of the following **EXCEPT**:
- A. Antibody-complement-mediated cell membrane injury
  - B. Failure of central tolerance
  - C. Hyperactivity of CD4<sup>+</sup> helper/inducer T<sub>H</sub>1 cells.
  - D. Antigen-antibody-complement complex deposition in tissues
  - E. Anti-receptor antibodies
22. Sjögren's syndrome is characterized by all of the following **EXCEPT**:
- A. Xerostomia
  - B. Keratoconjunctivitis sicca
  - C. Anti-SS-A and anti-SS-B autoantibodies
  - D. Destruction of thyroid follicles by infiltrating lymphocytes
  - E. Increased incidence of lymphomas
23. A 32-year old woman presents with dysphagia, symmetrical edema and thickening of the fingers, Raynaud's phenomenon and antibodies to Scl-70, a nonhistone nuclear protein. The most likely immunologic diagnosis is:
- A. Sjögren's syndrome
  - B. Polymyositis
  - C. Progressive systemic sclerosis
  - D. Systemic lupus erythematosus
  - E. Dermatomyositis
24. In rheumatoid arthritis, rheumatoid factor or RF is:
- A. Normally an IgM that reacts with the infectious agent that initiates the disease.
  - B. Usually an IgM that uses IgG as its antigen.
  - C. The cause of rheumatoid arthritis.
  - D. Totally unlike the RF recognized in systemic lupus erythematosus.
  - E. A Gm determinant.

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25. Amyloid, which has an amorphous, eosinophilic, hyaline fibrillar appearance, accumulates progressively in an extracellular location where it encroaches on and produces pressure atrophy of adjacent cells. All of the following statements are true of amyloid, **EXCEPT**:
- A. Amyloid deposition may cause conduction defects in the heart.
  - B. Amyloid in tissues stained with Congo red appears reddish and exhibits greenish birefringence by polarized light microscopy.
  - C. The AF type is associated with multiple myeloma.
  - D. The AA (amyloid-associated) type may follow chronic inflammatory conditions.
  - E.  $\beta_2$ -microglobulin accumulation constitutes a type of amyloid in some renal dialysis patients.
26. All of the following are true of acute graft-versus-host disease **EXCEPT**:
- A. Requires histoincompatibility between bone marrow donor and recipient
  - B. Requires immunocompetent lymphoid cells in donor marrow
  - C. Is mediated by NK effector cells
  - D. Requires an immunologically suppressed recipient
  - E. Injures the immune system and epithelia of the skin, liver and Intestines
27. All of the following are true of isolated IgA deficiency **EXCEPT**:
- A. Occurs in 1 in 600 individuals
  - B. Patients have extremely low levels of both serum and secretory IgA.
  - C. Patients have weakened mucosal defenses and increased infections of the respiratory, gastrointestinal and urogenital tracts
  - D. 40% of patients have serum antibodies to IgA that may cause an anaphylactic reaction following transfusion of blood containing IgA
  - E. Patients have a decreased frequency of respiratory tract allergy and of systemic lupus erythematosus and rheumatoid arthritis
28. The following immunodeficiency presents in infants with congenital heart defects and severe hypocalcemia (due to hypoparathyroidism). It is recognized soon after birth. These infants are subject to recurrent or chronic viral, bacteria, fungal and protozoal infections. It is caused by defective embryologic development of the third and fourth pharyngeal pouches which become the thymus and parathyroid glands.
- A. Bruton's X-linked infantile hypogammaglobulinemia
  - B. Transient hypogammaglobulinemia of infancy
  - C. Common variable immunodeficiency
  - D. Wiskott-Aldrich syndrome
  - E. DiGeorge syndrome

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29. All of the following are true **EXCEPT**:

- A. A six antigen match means that donor and recipient share 2 A, 2 B and 2 DR antigens.
- B. HLA Class I antigen matching is more significant for living related than for cadaveric renal allotransplants.
- C. A two DR antigen match is preferable to Class I antigen matching for cadaveric renal allotransplantation.
- D. A high percentage (> 90%) panel reactive antibody (PRA) is a favorable finding in patients awaiting renal allotransplants

30. All of the following are true **EXCEPT**:

- A. CXCR4 is a cell surface coreceptor for HIV.
- B. The CD4 molecule is a high affinity receptor for HIV.
- C. CCR5 is a cell surface coreceptor for HIV.
- D. In addition to CD4, HIV gp120 must also bind to other cell surface coreceptors to enter the host cell.
- E. Of the macrophage-tropic and T cell-tropic strains, 90% of HIV cases are transmitted by the T cell-tropic strains.

31. All of the following are true of Kaposi's sarcoma (K.S.) in AIDS patients **EXCEPT**:

- A. Kaposi's sarcoma is the most common neoplasm in AIDS patients
- B. Kaposi's sarcoma is composed of mesenchymal cells that form blood vessels and proliferate when stimulated by cytokines from tumor cells and HIV-infected T cells.
- C. Kaposi's sarcoma herpes virus is a viral cofactor in the pathogenesis of KS lesions.
- D. In HIV infected subjects, Kaposi's sarcoma is invasive and more aggressive than classic KS, affecting the skin, mucous membranes, gastrointestinal tract, lymph nodes and lungs.
- E. Kaposi's sarcoma is far more common in intravenous drug abusers than in homosexual or bisexual men.

32. The **BEST** marker of HIV disease progression is:

- A. Degree of weight loss
- B. HIV-1 viral load (HIV mRNA/mm<sup>3</sup>)
- C. CD4/CD8 ratio
- D. Pulmonary opportunistic infections
- E. Decreased absolute CD4 lymphocyte count

33. Acquired immune deficiency syndrome (AIDS) can include all of the following **EXCEPT**:

- A. Cytomegalovirus (CMV) infection
- B. Fever, weight loss, and lymphadenopathy
- C. *Pneumocystis carinii* pneumonia
- D. Increased cell-mediated immunity
- E. Kaposi's sarcoma

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34. An absolute CD4+ lymphocyte count below 200 cells/cu mm blood occurs in:
- A. Acute-graft-versus-host disease
  - B. Chronic granulomatous disease
  - C. Clinical AIDS
  - D. Multiple myeloma
  - E. Wiskott-Aldrich syndrome
35. The DNA index is usually calculated by dividing the channel number of the:
- A. Aneuploid peak by the diploid peak.
  - B. Aneuploid peak by the haploid peak.
  - C. Diploid peak by the aneuploid peak.
  - D. Diploid peak by the haploid peak.
  - E. Haploid peak by the aneuploid peak.
36. All of the following are true **EXCEPT**:
- A. Immunofluorescence (IF) preparations are temporary.
  - B. Immunoperoxidase stains only HLA antigens in tissues.
  - C. Immunoperoxidase can be used on archival materials.
  - D. Immunofluorescence utilizes polyclonal antibodies.
  - E. S-phase fraction (SPF) has independent predictive power.
37. You are doing research to develop a new anti-inflammatory treatment. You decide to focus on blocking the rolling and sticking of neutrophils to the endothelial lining to prevent the inflammatory response. What would be the best compound to focus on, from the list below, to prevent rolling and sticking of neutrophils?
- A. PECAM inhibitor
  - B. chemokine blocker
  - C. L-selectin blocker
  - D. histamine blocker
38. Which of the following cells is **NOT** typically characteristic of chronic inflammation?
- A. plasma cell
  - B. neutrophil
  - C. macrophage
  - D. lymphocyte
  - E. histiocyte



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39. Lower extremity ischemia leads to intensely painful necrosis of the foot and leg. A current research trial is underway to study ways to restore blood flow to the lower extremity by stimulating angiogenesis. The agent being used is a growth factor. Which of the following growth factors would you predict is being used?
- A. transforming growth factor-  $\beta$  (TGF- $\beta$ )
  - B. vascular endothelial growth factor (VEGF)
  - C. epidermal growth factor (EGF)
  - D. platelet-derived growth factor (PDGF)
40. What two phenomena consistently characterize irreversible cell injury?
- A. cell swelling and bleb formation
  - B. dilated endoplasmic reticulum and mitochondrial swelling
  - C. fatty change and mitochondrial permeability transition (MPT)
  - D. inability to reverse mitochondrial dysfunction and profound disturbances in membrane function
41. Which of the following does not typically lead to oxygen free radical cell injury?
- A. Reperfusion
  - B. Inflammation
  - C. toxic chemicals
  - D. complement activation
42. In many forms of cell injury there is an:
- A. influx of  $\text{Na}^+$  and  $\text{K}^+$
  - B. efflux of  $\text{Na}^+$  and  $\text{K}^+$
  - C. influx of  $\text{Na}^+$  and  $\text{Ca}^{++}$
  - D. influx of  $\text{K}^+$  and  $\text{Ca}^{++}$
43. Transforming growth factor- $\beta$  (TGF- $\beta$ ) is a powerful growth factor that stimulates fibrosis in areas of tissue necrosis. By what mechanism(s) does TGF- $\beta$  affect the fibrotic response?
- A. Stimulates fibroblasts to produce collagen
  - B. Inhibits collagenase activity
  - C. Both
  - D. Neither
44. The fading of the basophilia of nuclear chromatin in cell injury is referred to as:
- A. Karyorrhexis
  - B. Pyknosis
  - C. Karyolysis
  - D. intracellular hemosiderin accumulation

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45. A patient enters your clinic with hemochromatosis. A liver biopsy on this patient would most likely show which of the following?
- A. intracellular keratin accumulation
  - B. intracellular calcium accumulation
  - C. intracellular fat accumulation
  - D. intracellular hemosiderin accumulation
46. Which of the following is associated with an exudate containing neutrophils, necrotic cells, and edema that may lead to abscess formation?
- A. suppurative or purulent inflammation
  - B. serous inflammation
  - C. fibrinous inflammation
  - D. ascites
47. The intracellular enzymes that are activated in apoptosis and elicit many of the intracellular responses during apoptosis are known as:
- A. Lipases
  - B. Cyclooxygenase
  - C. Bcl-2
  - D. Caspase

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**MATCH THE FOLLOWING.**

48. Cryptococcus neoformans  
49. Group B streptococci  
50. Chlamydia

- A. most common cause of childhood otitis media
- B. etiologic agent of lymphogranuloma venereum
- C. yeast with narrow-necked budding from soil contaminated with pigeon droppings, causing lung and CNS disease
- D. yeast endemic in desert southwest U.S.
- E. cause of fulminant neonatal sepsis

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- 51. Shigella
- 52. Shingles
- 53. Infectious mononucleosis
- 54. Toxic shock syndrome

- A. Staphylococcus aureus
- B. Rubella
- C. Varicella-Zoster virus
- D. Bacillary dysentery
- E. Epstein-Barr virus

- 55. Dengue fever
- 56. Rocky Mountain Spotted Fever
- 57. Lyme disease

- A. Mosquito-borne viral infection also known as breakbone fever, fatalities chiefly in children
- B. Tick-borne rickettsial disease associated with petechial rash
- C. Tick-borne spirochetal disease with erythema chronicum migrans at inoculation site
- D. Mosquito-borne plasmodial disease characterized by cyclic hemolysis and fever
- E. Mosquito-borne viral hemorrhagic fever associated with fever, nausea, hepatic necrosis

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- 58. A localized area of ischemic necrosis
  - 59. Excess interstitial fluid
  - 60. An accumulation of blood in extravascular tissue
  - 61. Increased intravascular blood in a tissue or body part

- A. Infarct
- B. Edema
- C. Hematoma
- D. Embolism
- E. Congestion/Hyperemia

- 62. Trauma with significant blood loss
- 63. Cholera
- 64. Ruptured appendix
- 65. Massive myocardial infarct

- A. cardiogenic shock
- B. hypovolemic shock
- C. septic shock

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66. Subendothelial electron dense deposits  
67. Lupus anticoagulant  
68. Hemodialysis-associated amyloidosis  
69. Drug-induced lupus erythematosus
- A. Anti-histone autoantibodies  
B. Anti-neutrophil cytoplasmic antibodies (ANCA)  
C. “wire loop”  
D. anti-phospholipid antibodies  
E.  $\beta$ 2 microglobulin

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**MATCH THE ITEMS IN THE LEFT COLUMN WITH THE BEST ANSWER FROM THE RIGHT COLUMN.**

70. Cerebral infarct  
71. Tuberculosis  
72. Renal ischemia  
73. Pancreatitis
- A. Coagulative necrosis  
B. Liquefactive necrosis  
C. Caseous necrosis  
D. Fat necrosis

- 
74. Increased cardiac muscle mass in marathon runners  
75. Decrease in muscle mass from studying pathology instead of working out
- A. physiologic hyperplasia  
B. pathologic hyperplasia  
C. physiologic hypertrophy  
D. pathologic hypertrophy  
E. physiologic atrophy

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**GIVE THE REQUIRED DEFINITIONS FOR THE KEY WORDS.**

1. etiology
2. granulation tissue
3. hypertrophy
4. apoptosis
5. dehiscence
6. metaplasia
7. granulomatous inflammation
8. contagious
9. dysentery
10. ascitis
11. anasarca
12. petechiae
13. thrombus
14. shock

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2000-2001 Pathology Exam 1  
Answers

1 d	46 a
2 c	47 d
3 a	48 c
4 c	49 e
5 d	50 b
6 d	51 d
7 d	52 c
8 a	53 e
9 b	54 a
10 e	55 a
11 a	56 b
12 b	57 c
13 d	58 a
14 c	59 b
15 e	60 c
16 a	61 e
17 e	62 b
18 b	63 b
19 c	64 c
20 d	65 a
21 b	66 c
22 d	67 d
23 c	68 e
24 b	69 a
25 c	70 b
26 c	71 c
27 e	72 a
28 e	73 d
29 d	74 c
30 e	75 e
31 e	
32 b	
33 d	
34 c	
35 a	
36 b	
37 c	
38 b	
39 b	
40 d	
41 d	
42 c	
43 c	
44 c	
45 d	