

CHOOSE THE SINGLE BEST ANSWER FOR QUESTION 1 -72.

1. Which of the following does NOT involve antibodies?
 - A. Complement-mediated reactions
 - B. Graft vs. host responses
 - C. Toxin neutralization
 - D. Agglutination reactions
 - E. Immediate-type hypersensitivity

2. You have a monoclonal antibody that is specific for the Ig-alpha chain. When that molecule is detected on a cell you infer that the cell:
 - A. Is a mature B cell
 - B. Expresses surrogate light chains
 - C. Is an immature B cell
 - D. Can bind antigen
 - E. Is a stem cell

3. A patient presents with a syndrome in which chemotaxis of leukocytes to a site of infection is deficient. Which one of the following is more likely to be responsible? Absence of:
 - A. CD8+ lymphocytes
 - B. IL8
 - C. C3b receptors on vascular endothelium
 - D. Lysozyme
 - E. IL2

4. Corticosteroids are used to treat immediate hypersensitivity reactions because they:
 - A. Inhibit cytokine secretion
 - B. Promote synthesis of blocking antibodies
 - C. Inhibit immunoglobulin class switching
 - D. Function as bronchodilators
 - E. Block histamine binding to histamine receptors

5. Of the following, which applies to the thymus?
 - A. Entraps antigens that reach the lymph
 - B. Supports the development of virgin immunocompetent cells of both the B and T lineages
 - C. Acts on stem cells to produce immunologically competent B cells
 - D. Entraps antigens that reach the blood
 - E. Acts on progenitor cells to produce immunologically competent T cells

6. Using a monoclonal antibody, a cell is found to contain abundant cytoplasmic, but no membrane bound μ chains. This cell is a:
 - A. Pro-B cell
 - B. Immature B cell
 - C. Mature B cell
 - D. Memory cell
 - E. Plasma cell

7. In the innate immune response macrophages:
- A. Phagocytize IgG opsonized microorganisms
 - B. Lyse T-cell damaged tumor cells
 - C. Present antigen in the context of MHC to T-cells
 - D. Phagocytize bacteria bound to macrophages via lipopolysaccharide (LPS) receptors
 - E. Release histamine as part of acute inflammatory response
8. Which of the following surface markers is found exclusively on T cells?
- A. mIg
 - B. Fc receptors
 - C. Class I MHC
 - D. CD3
 - E. CD40
9. At which stage of B cell development is clonality first established?
- A. Pre-B cell
 - B. Immature B cell
 - C. Mature B cell
 - D. Memory cell
 - E. Plasma cell
10. The innate immune response can be distinguished from the acquired/adaptive immune response in that the innate response:
- A. Is specific
 - B. Is constitutive or preexisting
 - C. Requires prior contact
 - D. Is characterized by memory
 - E. Is exclusively cellular in nature

11. Of the following, which is the BEST way to achieve LONG LASTING gastrointestinal immunity?
- A. Suckling mother's milk
 - B. Bone marrow transplantation
 - C. Vaccinate by the oral route
 - D. Administer gamma globulin
 - E. Intravenous infusion of secretory IgA
12. The term double negative with respect to T cells denotes cells that they:
- A. Are at the earliest stage of T cell development
 - B. Express neither CD4 nor CD8 molecules
 - C. Express neither MHC I nor MHC II molecules
 - D. Express neither the gamma-delta TCR nor the alpha-beta TCR
 - E. Express neither the TCR nor the CD3 molecules
13. A patient has repeated infections with microorganisms that exist intracellularly in vesicles. The patient is most likely deficient in which one of the following cell types?
- A. CD4+, Th1 cells
 - B. CD4+, Th2 cells
 - C. CD8+ cells
 - D. Mast cells
 - E. B cells

14. A 42 year old male complains of excessive fatigue and upper back pain. Laboratory testing reveals that the patient is anemic, serum IgG levels are markedly elevated and protein is found in the urine. Electrophoretic analysis of the patient's SERUM is most likely to show:
- A. Polyclonal hypergammaglobulinemia
 - B. Hypogammaglobulinemia
 - C. Agammaglobulinemia
 - D. A monoclonal IgG spike
 - E. Waldenstrom's macroglobulinemia
15. In clinical bone marrow transplantation, further dose intensification is limited by organ toxicity of all EXCEPT:
- A. Lungs
 - B. Liver
 - C. Heart
 - D. Bone marrow
 - E. All of the above
16. At the gene level, the generation of the B & T cell repertoires is said to be "antigen-independent." This means that:
- A. B & T cell receptors that are specific for self antigens are not expressed
 - B. B & T cells can be activated by antigen-independent mechanisms
 - C. B & T cell repertoires are not influenced by exposure of the developing cells to antigen
 - D. The library of idiotopes (BCR's and TCR's) is generated independently of the library of epitopes
 - E. The repertoires of peripheral B & T cells are not influenced by exposure to antigen

17. A medical technologist, "John Drop-the-Tube", previously known to be tuberculin negative, accidentally is exposed to viable tubercle microorganisms. Two days after the accident he is tuberculin skin tested for delayed type hypersensitivity (DTH) and found to be negative. You can conclude that:
- A. He has not been infected
 - B. He has been infected but is immunosuppressed
 - C. It is unclear whether or not he has been infected.
 - D. That he has been infected with too low a dose to sensitize him
18. In describing fetal development of the human immune system, which of the following statements are ACCURATE?
- A. Thymic development is seen late
 - B. Circulating pre-B cells are seen at 16 weeks
 - C. Significant fetal contribution of Ig to circulation begins immediately after birth
 - D. Development reflects the evolutionary patterns seen in the animal phyla
 - E. All of the above
19. Isotype switching involves excision of C region genes of the Ig gene complex. Consequently, isotype switching:
- A. Can be reversed
 - B. Does not affect immunoglobulin function
 - C. Does not affect the heavy chain allotype
 - D. Does alter antigen specificity
 - E. May occur more than once

20. In the "cytokine mediated arm" of cell mediated immunity macrophages:
- A. Secrete IL3 and GM-CSF
 - B. Proliferate in response to antigens for which they are specific
 - C. Secrete IL2
 - D. Are activated by interferon gamma and CD40 ligand
 - E. Are activated by IL8
21. TRANSPLACENTAL passage of IgG is mediated by:
- A. S-component
 - B. F(ab)
 - C. Fc
 - D. J-chain
 - E. Poly-Ig receptor
22. The major clinical manifestation of complement deficiencies is:
- A. Recurrent fungal infections
 - B. Recurrent viral infections
 - C. Congenital heart defects
 - D. Decreased numbers of T helper cells
 - E. Recurrent infections with pyogenic microorganisms
23. Congenital MHC Class I deficiency is associated with a deficiency of CD8 T cells due to:
- A. A linked deficiency in perforin production
 - B. Absence of MHC I molecules from thymic epithelial cells
 - C. Anti-CD8 autoimmunity
 - D. Lack of help from defective CD4 T cells
 - E. Associated thymic aplasia

24. In assessing the potential for erythroblastosis fetalis, which of the following would be most important to evaluate in the circulation of a pregnant Rh- woman?
- A. Titer of anti-Rh antibody produced by fetus
 - B. Presence of paternal erythrocytes
 - C. Titer of anti-Rh antibody produced by pregnant woman
 - D. Titer of rheumatoid factor
 - E. Presence of fetal lymphocytes
25. The SMALLEST immunoglobulin fragment that retains the full capacity to bind antigen:
- A. Fab
 - B. $F(ab')_2$
 - C. Fc
 - D. Fv
 - E. H-chain
26. The agent to which a person has become sensitized with respect to contact sensitivity may be identified by 'patch' tests. After application of the antigen-containing patch(es) you would look for a positive result after what length of time?
- A. 1 minute
 - B. 15 minutes
 - C. 1 hour
 - D. 1 day
 - E. 2 days

27. A patient has a growing tumor despite the presence of cytotoxic T cells in the peripheral blood. This is an example of:
- A. Concomitant immunity
 - B. Immunological tolerance
 - C. Costimulation
 - D. Lack of immunogenicity
 - E. Immunoselection
28. Immunoglobulin class (isotype) specific determinants are associated with:
- A. L chain constant regions
 - B. H chain constant regions
 - C. L chain variable regions
 - D. H chain variable regions
 - E. J chains
29. The pH of APC can be raised by treatment with pharmacologic agents. The effect of this treatment is to block the:
- A. Binding of exogenous peptides to MHC II molecules
 - B. Degradation of exogenous proteins in endosomes
 - C. Interaction between MHC molecules and the TCR
 - D. Membrane expression of MHC I molecules
 - E. Transport of endogenous peptides into the endoplasmic reticulum

30. A patient presents with multiple bone lesions and a large amount of monoclonal immunoglobulin in his serum. As part of the diagnostic process urine is collected with the expectation that there may be found large amounts of free:
- A. Immunoglobulin light chains of both kappa and lambda type
 - B. Immunoglobulin Fc molecules
 - C. Immunoglobulin light chains of either kappa or lambda type
 - D. Immunoglobulin heavy chains
 - E. Whole monoclonal immunoglobulin molecules
31. The reduced relapse rates seen in leukemia from allogenic BMT as compared to autologous BMT is due to:
- A. Patient selection
 - B. Earlier transplantation
 - C. "Immune Surveillance" by donor graft
 - D. Immune suppression with cyclosporine
 - E. None of the above
32. In humans all of the following may be attributed to IgA EXCEPT:
- A. Inhibits adherence of oral microbes
 - B. Produced in greater quantities than all other immunoglobulin classes
 - C. Predominant immunoglobulin class in most internal secretions
 - D. Some forms require two cell types for biosynthesis
 - E. Can confer protection to the neonate

33. A clone of CD8 T cells has a specificity for a viral peptide **V1**, and an MHC I restriction phenotype of **Ia**, and an MHC II phenotype of **IIa**. Which of the following types of target cell would be specifically lysed by these CD8 T cells?

Selection	Target cell	Viral	MHC
MHC I phenotype Ia	Ib	MHC II phenotype	IIb
IIa	peptide expression		

34. A B-cell lymphoma (lymphoid tumor) patient fails to respond in a clinical immunotherapy trial in which the goal is to induce T-cell immunity to the tumor cells. A reason for the failure could be:
- A. Increased class II MHC antigen expression by tumor cells
 - B. Increased IL-2 secretion by tumor cells
 - C. Selection of an antigen acquisition variant
 - D. Lack of costimulation molecules on tumor cells
 - E. Increased surface Ig expression by tumor cells
35. Lymphocyte traffic into lymph nodes is:
- A. Mediated by cytokines
 - B. Mediated by specific adhesion molecules
 - C. Under the control of the poly-Ig receptor
 - D. Mediated by macrophages
 - E. The basis for the common mucosal immune system

36. Which of the following is INACCURATE with respect to immunoglobulin biosynthesis?
- A. H and L chains are made on separate polyribosomes
 - B. Secretion occurs by reverse pinocytosis
 - C. Carbohydrate addition occurs within the Golgi complex
 - D. Intrachain disulfide bonds form last
 - E. J chain catalyzes polymerization
37. The most important APC in the induction of contact sensitivity is:
- A. B cells
 - B. Dendritic cells
 - C. Langerhans cells
 - D. Macrophages
 - E. Mast cells
38. Which of the following is NOT an x-linked immunodeficiency disease?
- A. Chronic granulomatous disease
 - B. Bruton's agammaglobulinemia
 - C. Wiskott-Aldrich syndrome
 - D. DiGeorge Syndrome
39. Of the following, which test of a patient's serum would be used to measure IgE levels?
- A. Radial immunodiffusion
 - B. Free boundary electrophoresis
 - C. Quantitative precipitin test
 - D. Ouchterlony double diffusion
 - E. Radioimmunoassay

40. To which of the selections does the following statement pertain:
"antigen capture is immunologically specific, but antigen presentation to T cells is unconstrained by the immunological specificity of the antigen capture mechanism"?
- A. Presentation by B cells of endogenous antigen
 - B. Presentation by B cells of exogenous antigen
 - C. Presentation by macrophages of endogenous antigen
 - D. Presentation by macrophages of exogenous antigen complexed to specific antibodies
 - E. Presentation by macrophages of unopsonized exogenous antigen
41. A seventeen year old girl presents with a butterfly shaped rash on her face following exposure to the sun on her recent vacation. She also reports joint stiffness particularly in the mornings. Which of the following pattern of test results would be most consistent with these symptoms? Presence of:
- A. Antibody to double stranded DNA, decreased serum immunoglobulin, increased serum C3 levels
 - B. Antibody to double stranded DNA, increased serum immunoglobulin, decreased serum C3 levels
 - C. Antibody to ribonucleoproteins, decreased serum immunoglobulin, decreased serum C3 levels
 - D. Antibodies to platelets and red blood cells, increased serum immunoglobulin, increased serum C3 levels
 - E. Antibody to ribonucleoproteins, increased serum immunoglobulin, increased serum C3 levels

42. An animal is immunized with human serum albumin. The resulting antiserum (A) is tested against human serum albumin (HSA) and monkey serum albumin (MSA) by agar diffusion and gives the following results:

1 2
A

- Which reagents were placed in wells 1 and 2?
- A. Well 1 - HSA; well 2 - HSA
 - B. Well 1 - MSA; well 2 - HSA
 - C. Well 1 - HSA; well 2 - MSA
 - D. Well 1 - MSA; well 2 - MSA
 - E. Well 1 - HSA + MSA; well 2 - saline
43. Following the interaction of the TCR with MHC-peptide complex the major signal transduction pathway of the first signal is:
- A. gamma-delta heterodimer of the CD3 molecule
 - B. zeta-zeta homodimer of the CD3 molecular complex
 - C. CD4 molecule
 - D. Cytoplasmic regions of the alpha-beta chains of the TCR molecule
 - E. IL-2R

44. An 18 month old male child presents with near absent serum immunoglobulin levels, a history of repeated infections with pyogenic (pus producing) microorganisms beginning at 10 months of age, and a family history in which an uncle and a male sibling both died of pneumonia in childhood. Which assay results on peripheral blood lymphocytes would be most consistent with this history?
- A. Normal numbers CD3+ cells, no CD19+ cells, normal proliferation to phytohemagglutinin (PHA)
 - B. Elevated numbers CD3+ cells, no CD19+ cells, increased proliferation to PHA
 - C. Absence of CD3+ cells, no CD19+ cells, increased proliferation to PHA
 - D. Normal numbers CD3+ cells, elevated numbers CD19+ cells, no proliferation to PHA
 - E. Elevated numbers CD3+ cells, elevated numbers CD19+ cells, increased proliferation to PHA.
45. A transfusion reaction occurs after type A Rh⁺ blood is mistakenly administered to a type B Rh⁻ male. The primary cause of this transfusion reaction is:
- A. Donor Rh antibodies interacting with recipient RBC
 - B. Donor isohemagglutinins interacting with recipient RBC
 - C. Recipient isohemagglutinins interacting with donor RBC
 - D. Recipient Rh antibodies interacting with donor RBC
 - E. Reactivity of both recipient Rh antibodies and isohemagglutinins with donor RBC
46. Both genders are affected by HANE, and the level of C1INH in the serum of affected individuals is 5-30% of normal activity. Based on this information you can infer that inheritance of HANE is:
- A. Autosomal dominant
 - B. Autosomal recessive
 - C. Sex-linked dominant
 - D. Sex-linked recessive

47. Which one of the following phenotypes would most likely be a result of a mating between a man and woman of the following genotypes:

Male: HLA-A1,B2,C3,D4/HLA-A5,B6,C7,D8

Female: HLA-A9,B10,C11,D12/HLA-A13,B14,C15,D16

- A. HLA-A5,B6,C7,D8/HLA-A1,B2,C3,D4
 - B. HLA-A9,B10,C11,D12/HLA-A7,B8,C9,D10
 - C. HLA-A9,B10,C11,D12/HLA-A1,B2,C3,D4
 - D. HLA-A13,B14,C15,D16/HLA-A9,B10,C11,D12
 - E. HLA-A1,B6,C7,D4/HLA-A9,B14,C15,D12
48. Graft Versus Host Disease is caused by:
- A. Donor T-cells from the graft
 - B. Donor B-cells from the graft
 - C. Patient derived T-cells
 - D. Patient derived B-cells
 - E. Monocytes
49. Of the following, which test is NOT suited to directly measure serum antibodies to specific microbial antigens?
- A. Agglutination tests
 - B. Free boundary electrophoresis
 - C. Enzyme linked immunosorbent assays
 - D. Radioimmunoassays
 - E. Western blotting

50. Which of the following best conforms to the concept of 'antigenic specificity'?
- A. Activation of T cells by anti-CD3
 - B. Activation of T cells by superantigen
 - C. Binding of peptide to MHC II molecules
 - D. Capture of antigen by macrophages
 - E. Capture of antigen by B cells
51. A patient presents with multiple myeloma and is noted to have a recent history of repeated infections. The repeated infections are most likely, in part, due to:
- A. Malignant plasma cells in the bone marrow crowding out production of neutrophils
 - B. Malignant NK cells in the bone marrow crowding out production of neutrophils
 - C. Malignant neutrophils in her bone marrow crowding out production of plasma cells
 - D. Malignant plasma cells in her circulation crowding out production of neutrophils
 - E. Malignant plasma cells in her germinal centers crowding out production of neutrophils
52. Flow cytometry has been used for all of the following clinical applications EXCEPT:
- A. Assessing the prognosis of HIV-positive patients
 - B. Monitoring immune reconstitution in bone marrow transplant recipients
 - C. Diagnosis and classification of lymphomas
 - D. Monitoring the progress of desensitization in allergy patients
 - E. Assessing the progress of immunotherapy in immunodeficiency diseases

53. The most important cytokine in driving T cells along the Th1 pathway is:
- A. IL-1
 - B. IL-2
 - C. IL-4
 - D. IL-10
 - E. IL-12
54. Which treatment would be most appropriate for a 2 year old child with X-linked agammaglobulinemia who has suffered repeated infections with pyogenic (pus producing) microorganisms since 1 year of age?
- A. None is needed because of likely spontaneous recovery in next 6 months
 - B. Antibiotics as needed
 - C. Allogeneic plasma cell transplant
 - D. Antibiotics as needed and weekly intravenous injections of gammaglobulin
 - E. Antibiotics as needed and reimmunization with all childhood vaccines
55. In which of the following cases is the risk of developing erythroblastosis fetalis the greatest?
- A. A⁺Rh⁻ mother, B⁺Rh⁺ father, B⁺Rh⁺ fetus
 - B. B⁺Rh⁻ mother, A⁺Rh⁺ father, A⁺Rh⁺ fetus
 - C. A⁺Rh⁻ mother, B⁺Rh⁺ father, A⁺Rh⁺ fetus
 - D. O⁺Rh⁻ mother, B⁺Rh⁺ father, B⁺Rh⁺ fetus
 - E. O⁺Rh⁻ mother, A⁺Rh⁺ father, A⁺Rh⁺ fetus

56. Which of the following is antigen-dependent?
- A. Degradation of exogenous proteins
 - B. Expression of MHC II molecules
 - C. Negative selection of B cells
 - D. Positive selection of T cells
 - E. VDJ Ig gene rearrangement
57. Skin from mice of strains B and C, which differ completely from each other at the MHC, is transplanted onto the back of another strain C mouse. Strain B skin is rejected in 14 days, while strain C skin is not rejected. A second transplant of strains B and C skin is made onto the back of the strain C mouse that rejected the strain B skin and maintained the strain C skin. How long would the second strain C skin transplant be maintained?
- A. For the life of the mouse
 - B. 14 days
 - C. 6 days
 - D. 2 days
58. A viral glycoprotein vaccine is highly effective, despite the fact that the protective antibodies are directed against an oligosaccharide sequence which is not in itself immunogenic. This phenomenon is an expression of which of the following concepts?
- A. Clonal selection
 - B. Hapten-carrier effect
 - C. MHC restriction
 - D. Negative selection
 - E. Self recognition

59. The probability of differences at minor transplantation antigen loci is more likely to be decreased in grafts between:
- A. Allogeneic individuals
 - B. MHC mismatched people
 - C. Unrelated, MHC matched people
 - D. Xenogeneic individuals
 - E. Siblings
60. The most common immunodeficiency disease is:
- A. DiGeorge syndrome
 - B. Chronic mucocutaneous candidiasis
 - C. Selective IgA deficiency
 - D. IgM deficiency
 - E. Ataxia-telangiectasis
61. You prepare a monoclonal antibody for administration to a patient as immunotherapy. Which of the following would best explain your strategy of coupling the antibody to a short acting radioisotope prior to administration? The coupled antibody will:
- A. Gain easier access to the tumor site
 - B. Be more effective in killing tumor cells with which it combines
 - C. Have a longer half life in the circulation
 - D. Be more specific for tumor cells
 - E. Be less toxic to the patient

MATCHING ITEMS

In each of the following groups there are two numbered lists. Mark on the answer sheet in the line corresponding to each question number in the lower list (62-72) the letter of the related item of the upper list. In every instance there is an answer; however, all the statements in the upper list will not necessarily be used.

DIRECTIONS: Select items A-E below which best fit statements numbered 62 - 64. Choices may be used more than once.

- A. C1q
- B. C3b
- C. C8
- D. C5a
- E. C5b

- 62. Which component of complement produces transmembrane channels in cells?
- 63. Which component of complement can serve as an opsonin for microorganisms?
- 64. Which complement component exhibits chemotactic activity?

DIRECTIONS: Select items A-E below which best fit statements numbered 65 - 66. Choices may NOT be used more than once.

- A. Serotonin
- B. Histamine
- C. C3b
- D. Eosinophil chemotactic factor
- E. Neutral protease

- 65. The major mediator of anaphylaxis in humans
- 66. An important component of the late phase of anaphylaxis

DIRECTIONS: Select items A-E below which best fit statements numbered 67 - 69. Choices may be used more than once.

- A. Anti-receptor antibodies
 - B. Rheumatoid factor
 - C. Class I major histocompatibility complex association
 - D. Class II major histocompatibility complex association
 - E. Coombs' positive hemolytic anemia
67. Myasthenia gravis
68. Graves' disease
69. Insulin-dependent diabetes

DIRECTIONS: Select items A-E below which best fit statements numbered 70 - 72. Choices may be used more than once.

- A. Positive selection
 - B. Negative selection
 - C. B7-CD28 costimulatory pathway
 - D. Affinity maturation
 - E. Suppressor T cells
70. Clonal anergy of T cells
71. Feedback inhibition of antibody production
72. Production of interleukin 10