A LIST OF POSSIBLE EXAM QUESTIONS - WITH ANSWERS

MULTIPLE CHOICE FORMAT
Each item or incomplete statement in this section is followed by answers or by completion of the statement. Circle the one lettered answer or completion that is best in each case.

1. Which of the following are two hallmarks of the adaptive immune system?
   A. Immediate and Broad
   X B. Specificity and Memory
   C. Innate and Short
   D. Non-Specific and Fast
   E. Immediate and Passive

2. You would want the cells from a potential transplantation donor to have or do all of the following EXCEPT
   A. a match for class II MHC.
   B. a match for class I MHC.
   X C. stimulate proliferation of your peripheral white blood cells.
   D. be free of HIV.
   E. be matched for blood group antigens.

3. All of the following are important functions of the innate immune system EXCEPT that it
   A. promotes early defense against infectious agents.
   B. has immunoregulatory functions.
   C. recognizes microbes through receptors for "molecular patterns".
   X D. has specific receptors for antigens.
   E. has nonclonal distribution of receptors.

4. All of the following are cytokines of the innate immune system EXCEPT
   A. TNF.
   B. IL-12.
   C. NK cell produced IFN-γ.
   D. type I IFNs.
   X E. IL-2.
5. Acute rheumatic fever is an example of which of the following?

A. an autoimmune disease
B. molecular mimicry with induction of the disease dependent upon an immune response to a
   Streptococcal cell wall antigen cross-reacting with a myocardial antigen
C. breaking of tolerance to self
D. a disease dependent upon antibody
X E. all of the above

6. The Thoracic duct
X A. is the lymphocyte port of entry to the blood from the lymphatic system.
B. was a major aqueduct in ancient Rome.
C. is the Dendritic cell port of entry for travel from the periphery to the lymph node.
D. is part of the air venting system in the BMC.
E. facilitates transfer of maternal antibody to the fetus.

7. Mechanisms for inducing tolerance to self include which of the following?

A. central tolerance resulting from deletion of self reactive cells in the thymus
B. peripheral tolerance resulting from deletion of self-reactive cells
C. peripheral tolerance resulting from anergy
D. A and B
X E. A, B and C

8. An individual is genetically deficient for the IFN-γ receptor. Which of the following would you expect to be blocked?

A. NK Cell Development.
B. Cell Surface Expression of A Functional T Cell Receptor for Antigen on Mature T Cells
C. IgM Antibody Responses
X D. Antimicrobial Defense
E. Immunoglobulin Gene Rearrangement

9. Which of the following can NOT be found in the lymph node?

A. lymphoid follicle
X B. red pulp
C. B cells
D. cortex
E. T cells
10. What is receptor editing?
   A. a downstream consequence of exposure to high concentrations of bacterial endotoxin
   X B. a mechanism for inducing B cell tolerance by changing the specificity of the antigen receptor
   C. a mechanism for changing the pattern recognition molecules of the innate immune system
   D. what APCs do to present antigen to T cells
   E. responsible for antibody-dependent autoimmunity

11. If you had a tumor but did not know which of its proteins might be an antigen, what might be the best procedure to attempt to induce an immune response against it?
   A. vaccinate with dendritic cells genetically modified to express tumor antigens
   B. vaccinate with dendritic cells pulsed with tumor antigens
   X C. vaccinate with tumor cells genetically modified to expression costimulatory molecules
   D. treat with IL-13
   E. deplete endogenous T cells

12. Mechanisms with the potential to contribute to allogeneic graft rejection include all of the following EXCEPT
   A. antibody-mediated hyperacute rejection
   B. CTL-mediated cell destruction.
   C. T cell-enhanced acute rejection.
   D. chronic rejection with vessel occlusion.
   X E. passenger lymphocytes.

13. Positive and negative selection processes in the thymus generate a T cell repertoire that is both self-tolerant and self-restricted. This means that the mature T cells that develop have a repertoire of receptors that are specific for:
   A. non-self antigenic peptides bound to non-self MHC molecules
   B. self antigenic peptides bound to self-MHC molecules
   C. self antigenic peptides bound to non-self MHC molecules
   D. non-self antigenic peptides bound to self-MHC molecules
   E. any peptide antigen bound to any MHC molecule.

14. A mature naive helper T cell would express which combination of the surface molecules designated TCR (α/β) CD4 and CD8?
   A. TCR- CD4- CD8-
   B. TCR+ CD4+ CD8+
   C. TCR+ CD4-CD8-
   D. TCR- CD4+ CD8-
   E. TCR+ CD4+ CD8-
15. Cytotoxic T cells (CTL) isolated from an individual infected with Virus A will kill virally infected cells in an in vitro assay. What viral antigen/MHC molecule combination do these CTL recognize?

A. Infected with Virus A and expressing the identical MHC Class I molecules as the CTL
B. Infected with Virus B and expressing the identical MHC Class I molecules as the CTL
C. Infected with Virus A and expressing different MHC Class I molecules as the CTL
D. Infected with Virus B and expressing different MHC Class I molecules as the CTL
E. Infected with any virus

16. Which "receptor/ligand" pair supplies the crucial second signal for activation of B lymphocytes by T helper cells?

A. CD4/MHC Class II
B. LFA-1/ICAM-1
C. CD28/CD80(B7)
D. Antigen/immunoglobulin
E. CD2/CD58.

17. The TH2 subset of CD4+ T helper cells is best characterized by the release of which cytokine(s)?

A. IFN-\(\gamma\), TNF-\(\beta\)
B. IL-12
C. IL-2
D. IL-7
E. IL-4, IL-5

18. Which characteristic best describes the secondary immune response?

A. IgM production predominates
B. Lesser amounts of antigen-specific antibody exist in serum
C. There is a switch to a lower affinity antibody
D. Occurs with a shorter lag period after antigenic stimulation
E. Requires a larger dose of antigen for initiation of a response

19. A baby suffering from recurrent infections is found to have no detectable B or T lymphocytes. This immunodeficiency is most probably the result of a defect in:

A. the spleen
B. the thymus
C. T-B cell cooperation
D. lymphoid stem cells
E. the Bursa of Fabricius
Concerning generation of antigen receptor diversity:

A. Both the light and heavy immunoglobulin chain variable regions are encoded by V, D and J gene segments
B. Diversity can only be generated before encountering antigen
C. In T cells, N-nucleotide addition occurs only in heavy chains.
D. Somatic hypermutation occurs in both B and T cells.
E. Antibodies produced late in an immune response have increased affinity for antigen.

21. IgA:

A. Is important in cell-mediated immunity
B. Is found in breast milk
C. Is the most abundant immunoglobulin in the blood
D. Cannot fix complement
E. Is the only mucosal antibody that does not undergo class switching

23. The class of immunoglobulin present in highest concentration in the blood of a newborn infant is?

A. IgG
B. IgA
C. IgA and IgE
D. IgM
E. IgD

24. Antigen-presenting cells that activate helper T cells must express which one of the following on their surfaces?

A. IgE
B. Gamma interferon
C. Class I MHC
D. Class II MHC

25. Which one of the following is NOT true regarding the alternative complement pathway?

A. It can be triggered by infectious agents in the absence of antibody
B. It does not require C1, C2, or C4
C. It cannot be initiated unless C3b fragments are already present
E. It has the same terminal sequence of events as the classical pathway
26. C3 is cleaved to form C3a and C3b by C3 convertase. C3b is involved in all of the following EXCEPT:

A. altering vascular permeability  
B. promoting phagocytosis  
C. forming alternative-pathway C3 convertase  
D. forming C5 convertase

27. Which one of the following is NOT released by activated helper T cells?

A. Gamma interferon  
B. Interleukin-4  
C. Interleukin-2  
D. Alpha interferon

28. During the maturation of a B lymphocyte, the first immunoglobulin heavy chain synthesized is the:

A. gamma chain  
B. mu chain  
C. epsilon chain  
D. alpha chain

29. Which of the following is NOT true of class I MHC antigens?

A. They are found mainly on B cells, macrophages, and activated T cells  
B. They are controlled by at least three gene loci in the MHC  
C. They are important in human transplantation  
D. They are codominantly expressed

30. The antibody-binding site is formed primarily by:

A. the constant regions of H and L chains  
B. the hypervariable regions of H chains  
C. the hypervariable regions of H and L chains  
D. the variable regions of L chains  
E. the variable regions of H constant chains

31. Antigen-presenting cells that activate cytotoxic T cells must express which one of the following on their surfaces?

A. IgG  
B. Gamma interferon  
C. Class II MHC antigens  
D. Class I antigens
32. Which one of the following properties of antibodies is NOT dependent on the structure of the heavy-chain constant region?
   A. Isotype
   B. Ability to fix complement
   C. Ability to cross the placenta
   D. Affinity for antigen

33. Regarding Th-1 and Th-2 cells, which one of the following is the LEAST accurate?
   A. Th-2 cells produce interleukin-4 and -5 and promote antibody-mediated immunity
   B. Both Th-1 and Th-2 cells express CD3 and CD4 cell surface proteins
   C. Before naïve Th cells differentiate into Th-1 or Th-2 cells, they are capable of producing both gamma interferon and interleukin-4 or interleukin-5
   D. Th-1 cells produce gamma interferon and promote cell-mediated immunity
1. A needle that had been in a patient accidentally stabbed a healthcare worker. How would you determine if the worker was infected with HBV as a result of the incident?

[serology negative for antibodies to HBV at time of incident but becomes positive with time after exposure]

2. An individual appears in your office with a tumor for which there is an exciting new treatment based on stimulating the immune response to the cancer cells. This person also has a liver transplant and is on Cyclosporine as an immunosuppressive therapy. What would you do? Why?

[probably nothing; stimulating the immune system to fight the cancer may result in rejection of the organ graft]

3. What is the evidence supporting the effectiveness of vaccination for some common infectious diseases? Give one example of a disease dramatically reduced by vaccination.

[comparison of maximum number of cases with number of cases in 2000 for the percent change; diphtheria, measles, mumps, pertussis, polio (paralytic), rubella, tetanus, H. influenza type B, or hepatitis B]

4. An individual has a mutation severely inhibiting the natural function of the CD40 ligand. What would be the consequences? Why?

[hyper IgM syndrome (lots of IgM less of the other subclasses) with defects in T cell-dependent B cell and macrophage activation; no second signal for T cell help]

5. An individual presents with overwhelming opportunistic infections and a CD4 T cell count of less than 200 cells/mm³. What might you expect is happening? How would you prove this?

[AIDS resulting from HIV infection; detection of virus]