Example Questions covering Chapter 5 and 6

*Please note that these questions are ONLY here to help. They are NOT actual test questions. Some, all, or none of these topics may be on your exam. Professor Weigel did not review this. Do NOT use this as your ONLY study resource, continue to review PowerPoints, recordings, textbook, notes, light board videos, etc*

1. One TCR can bind to different antigens
   a. True
   b. False

2. MHC genes are diverse because:
   a. They are polymorphic within the individual.
   b. They are polymorphic within the population.
   c. They are monomorphic within the population.
   d. A & B

3. Which of the following statements is TRUE regarding TCR’s?
   a. They have the same structure as BCR’s.
   b. They can be found in both soluble and insoluble form.
   c. Has two chains, each with a constant and a variable region.
   d. They have the same isotypes as BCR’s (i.e. IgG, IgA, etc).

4. The α locus:
   a. Will contain the Cδ gene.
   b. Has V, D, and J gene segments.
   c. Has V and J gene segments.
   d. A & C.

5. Which statement is/are TRUE regarding SCID?
   a. T cells are functional because with SCID, TCR recombination is not affected.
   b. T cells are not functional because with SCID, TCR recombination is affected.
   c. One of the RAG genes is affected, which does not influence the TCR recombination.
   d. B & C.

6. Once a T Cell has rearranged a TCR, which of the following membrane proteins will it need to leave the Endoplasmic Reticulum to get to its final destination?
   a. Two ε, one γ and two δ.
   b. Two ε, two γ, two δ and one ξ.
   c. One ε, one γ, one δ and two ξ.
   d. Two ε, one γ, one δ and two ξ.

7. Why is the ξ chain important?
   a. Has a key role in stabilizing the TCR.
b. These chains transduce the signal from the extracellular space to the intracellular space

c. Aid with adhesion of the TCR/MHC complex.

d. Remembering them because Prof Weigel told us to.

8. A γδ T Cell is restricted to recognition of antigens through MHC molecules.
   a. True
   b. b. False

9. MHC I:
   a. Two transmembrane chains, with two α chains and two β chains.
   b. One transmembrane chain, three α chains, one β2 microglobulin.
   c. Has one α1 and one α2 that will form the peptide binding site.
   d. B & C.

10. A CD4 Th1 cell, that was previously activated by a dendritic cell (who presented exogenous peptides through an MHC I), will activate macrophages so that they can start secreting cytokines and phagocytize the pathogen that’s infecting.
   a. True
   b. False

11. The Membrane Attack Complex can be formed by:
   a. C3bBb
   b. iC3b
   c. C4b2a3b
   d. A & C

12. The β2 microglobulin gene is encoded in the same loci as the MHC genes.
   a. True
   b. False

13. Kevin was taken to the doctor because of an upper respiratory infection that he does not seem to be able to clear (has a chronic respiratory infection). A differential blood cell count showed that Kevin had a normal lymphocyte count, but a genetic mapping of his HLA genes showed that there were several mutations that affected his TAP proteins. Most likely Kevin has:
   a. No opportunity to load peptides on an MHC I molecule.
   b. Severe Combined Immunodeficiency.
   c. Bare Lymphocyte Syndrome.
   d. A & C.

14. A γδ T Cell:
   a. Is not restricted to antigen recognition by MHC presentation.
b. Is the most abundant T cell in the body.
c. The $\gamma$ gene segments are situated between the $V\alpha$ and $J\alpha$ gene segments.
d. A & B.

15. The max number of MHC I genes Prof Weigel could receive from his parents, in the event that he is homozygous for the MHC I locus is:
   a. 3
   b. 6
   c. 9
   d. 12

16. Which of the following statements regarding CD4 T cells is/are NOT true?
   a. Can differentiate into only two subcategories: Th2 and Th1.
   b. Cd4 Th1 cells will stimulate B cells to produce antibodies.
   c. Are cytotoxic cells that specialize in killing cells who are infected with intracellular pathogens.
   d. All the above.

17. Which of the following statements is/are true?
   a. MHC I can present antigen to both CD4 and CD8 T cells.
   b. MHC II can present antigen to both CD4 and CD8 T cells.
   c. MHC I can present antigen to CD8 T Cells, and MHC II can present antigen to CD4 T Cells.
   d. MHC II can present antigen to CD8 T Cells, and MHC I can present antigen to CD4 T Cells.

18. Which statement about Calnexin is/are true?
   a. Is one of the proteins involved in the loading of a peptide in an MHC II.
   b. Will release the MHC I when the $\beta 2$microglobulin binds to the $\alpha 1$ chain.
   c. Is a chaperone protein.
   d. B & C

19. BEFORE the MHC II enters the phagolysosome:
   a. The MHC II will be in an endocytic vesicle called MIIC, where proteases will cleave the invariant chain that are blocking the binding site of the MHC II, leaving just the CLIP.
   b. The MHC II will be in an endocytic vesicle called MIIC will be loaded with the antigen before fusing with the phagolysosome.
   c. The HLA-DM will catalyze the release of the CLIP so that the MHC II in the MIIC can be loaded with the antigen peptide.
   d. A & C

20. The TAP heterodimer will transport:
   a. Polypeptides of less than 8 amino acids
b. Polypeptides of more than 8 amino acids.
c. Polypeptides with hydrophilic residues at the carboxy terminus.

d. B & C.

21. Can a macrophage load an extracellular peptide on an MHC I?
   a. Yes, a macrophage can load an exogenous peptide both on MHC II and MHC I
   b. No, a macrophage can only load exogenous peptides on MHC II.
   c. This process is called cross presentation
   d. A & C

22. When interacting with a TCR, the peptide loaded on the MHC will mainly interact with the ____ region of the TCR, while the ____ and ____ regions will interact and recognize the MHC.
   a. CDR1; CDR2, CDR3
   b. CDR3; CDR1, CDR2
   c. CDR2; CDR1, CDR3
   d. All CDR’s interact with both peptide and MHC.

23. HLA-A:
   a. Will present antigen to a CD4 T cell.
   b. Will present antigen to a CD8 T cell.
   c. Is one MHC I isotype. Other isotypes include HLA – B and HLA – C.
   d. B & C

24. A bone marrow transplant can:
   a. Lead to a host vs. graft response.
   b. Lead to a graft vs. host response.
   c. It’s 100% safe.
   d. None of the above.

25. Which of the following is/are a secondary lymphoid tissue?
   a. Bone marrow
   b. Peyer’s patches
   c. Spleen.
   d. C & D

26. Arrange the development stages of the B cell in the correct order:
   a. Early pro – Late pro – Small pre – Large pre – Immature – Mature.
   b. Mature – Large pro – Small pre – Large pre – Early pro – Immature
   c. Late pro – Early pro – Large pre – Small pre – Immature – Mature
   d. Early pro – Late pro – Large pre – Small pre – Immature – Mature.

27. A large pre B-cell is distinguished by:
   a. Pre-B-cell receptor which consists of a completely functional Heavy and Light chain with its Igα and Igβ side chains
   b. Pre-B-cell receptor which consists of a Heavy and Surrogate Light chain with its Igα and Igβ side chains.
c. Has a surrogate light chain that tests whether the H chain will be able to bind to a L chain.
d. B & C.

28. A Large Pre-B cell who just assembled a Pre-B cell receptor will:
   a. Signal the cell to continue somatic recombination before performing any rounds of division
   b. Induce allelic exclusion by signaling the cell to turn off RAG genes and destroy RAG2.
c. Stop any rounds of divisions.
d. All of the above.

29. A large pre-B-cell will rearrange its V/J gene segments of the L chain at the same time that the VDJ gene segments of the H chain are being rearranged.
   a. True
   b. False

30. The surrogate light chain:
   a. Resembles the Heavy chain
   b. Is composed by two structures, VpreB and λ5, that test the binding of the H chain to the L chain.
c. Can bind to antibodies.
d. All of the above.

31. You can find small pre-B-cells in your body with surrogate light chains.
   a. True
   b. False

32. A mature B-cell will choose whether to produce IgM or IgD through:
   a. Somatic Recombination
   b. Somatic Hypermutation
   c. Junctional Diversity
d. mRNA Splicing

33. A mature B-cell will choose whether to produce a soluble Ig or a BCR through:
   a. Somatic Recombination
   b. Somatic Hypermutation
   c. Junctional Diversity
d. mRNA Splicing

34. Stromal cells:
   a. Are specialized cells in the secondary lymphoid tissue that provide specialized environment for B-cells at various stages of growth.
b. Produce IL-7 which will stimulate the growth and proliferation of pre-B-cell.
c. B cells will have vascular addressins on their surface, while Stromal Cells will have selectins on their surface. These will interact and provide the binding between cells.
d. A & B.
35. If the first H chain rearrangement attempt of a B cell is unproductive:
   a. It can use the genetic material in that same chromosome to try another rearrangement.
   b. It’s going to have to die by apoptosis
   c. It’s going to use its homologous chromosome to try a second rearrangement.
   d. B cells will never have an unproductive rearrangement.

36. Less than half of the total number of B-cells produced in the bone marrow are able to produce a functional antibody:
   a. True
   b. False

37. Pre-BCR is also known as the ____ checkpoint, which is a _____ signal that _____ apoptosis.
   a. 1st; negative; allows
   b. 2nd; positive; prevents
   c. 1st; positive; prevents
   d. 2nd; negative; allows

38. RAG1 and RAG2 are:
   a. Turned on once, and remain active for the remainder of the B cell’s life.
   b. Turned on and off twice; the last time these are turned off is when the B cell is able to produce a BCR with Igα and Igβ
   c. Never turned on.
   d. Turned on/off once during the B cell maturation process.

39. A translocation of the MYC gene will:
   a. Give you superpowers.
   b. Cause Burkitt’s lymphoma.
   c. Cause SCID.
   d. Cause Bare Lymphocyte Syndrome

40. Which of the following statement/s regarding B1 cells is/are true?
   a. They have IgM and IgD on their surface
   b. They are known as CD5 cells
   c. They are the most common type of B cell found in your body.
   d. Is least active in the prenatal period.

41. Anergy is when B cell becomes nonresponsive to a specific antigen and most of the IgM is retained inside the cell, not put on surface?
   a. True
   b. False

42. Prenatal B1 cells have little diversity because:
   a. AID is not expressed in the prenatal period.
   b. TdT is not expressed in the prenatal period.
   c. The VDJ junctions are more diverse
   d. None of the above.
43. If an immature B cell that is reactive to multivalent self-antigen is not eliminated:
   a. There is a risk of developing an interimmune disease
   b. There is a risk of developing an autoimmune disease
   c. No disease will be caused from it.
   d. There is no chance that a B cell can recognize self-antigens.

44. Receptor editing refers to:
   a. B cell utilizing its RAG enzymes to produce a new L chain productive rearrangement after recognizing a multivalent self-antigen.
   b. B cell utilizing its RAG enzymes to produce a new H chain productive rearrangement after recognizing a multivalent self-antigen.
   c. B cell utilizing its TdT enzymes to produce a new H chain productive rearrangement after recognizing a multivalent self-antigen.
   d. B cell utilizing TdT enzymes to produce a new L chain productive rearrangement after recognizing a multivalent self-antigen.

45. The key difference between TCR and BCRs is the way antigen is recognized?
   a. True
   b. False

46. B cells enter the secondary lymphoid tissue through:
   a. Arteries
   b. Veins
   c. High endothelial venules
   d. A & C

47. Chemokines _____ and _____ attract B cells to the HEV and lymph node respectively.
   a. CCL29 ; CCL21
   b. CCL21 ; CCL19
   c. CXCL13 ; CCL19
   d. CCL21 ; CXCL13

48. In the germinal center:
   a. Centroblasts are large proliferating B cells.
   b. Centrocytes are dividing B-cells that are undergoing somatic hypermutation and Ig class switching
   c. Centrocytes and FDC occupy the light zone
   d. A & C

49. The light chain of the B cell receptor rearranges first then the heavy chain rearranges second.
   a. True
   b. False

50. Plasma cells can differentiate directly from:
   a. Isotype switched B cells
   b. Hypermutated centrocytes
   c. Memory B cells
   d. All of the above.