

Assignment (Antigen Processing and Presentation)

20 marks

Attempt the questions as directed

1. For each of the following cell components or processes, indicate whether it is involved in the processing and presentation of exogenous antigens (EX), endogenous antigens (EN), or both (B). 2

- a. _____ Class I MHC molecules
- b. _____ Class II MHC molecules
- c. _____ Invariant (Ii) chains
- d. _____ Lysosomal hydrolases
- e. _____ TAP1 and TAP2 proteins
- f. _____ Transport of vesicles from the RER to the Golgi complex
- g. _____ Proteasomes
- h. _____ Phagocytosis or endocytosis
- i. _____ Calnexin
- j. _____ CLIP

2. The _____ T cell-APC interaction is MHC _____-restricted, and the _____ T cell-target cell interaction is MHC _____-restricted. 2

- a. CD4+; Class I; CD8+; Class II
- b. CD4+; Class II; CD8+; Class I
- c. CD8+; Class I; CD4+; Class II
- d. CD8+; Class II; CD4+; Class I

3. Which of the following describes where class I MHC is found and not where class II MHC is found? 1

- a. B cells
- b. Dendritic cells
- c. Macrophages
- d. Antigen presenting cells (A, B, & C)
- e. All nucleated cells

4. The invariant chain_____ the empty peptide-binding groove. After vesicle fusion, the invariant chain is_____ and peptides can enter the MHC class II groove. 2

- a. Activates; Added
- b. Activates; Degraded
- c. Blocks; Added
- d. Blocks; Degraded

5. In the processing pathway for intracellular antigens, the proteasome will_____ viral protein molecules until peptides of_____ residues are formed; these can bind to class I MHC molecules. 2

- a. Build; 8-11
- b. Build; 9-30
- c. Break down; 8-11
- d. Break down; 9-30

6. The transporter associated with antigen presentation (TAP)_____ the peptides to traverse the membrane bilayer of the endoplasmic reticulum and bind in the empty peptide-binding groove of nascent MHC_____ molecules being synthesized in the endoplasmic reticulum. 2

- a. Permits; Class I
- b. Permits; Class II
- c. Does not allow; Class I
- d. Does not allow; Class II

7. Mutations in TAP-1 or TAP-2 may alter the function of the heterodimer TAP. Which of the following is common for patients with TAP mutations? 1

- a. Human immuno-deficiency virus (HIV) infection
- b. Acquired immune deficiency syndrome (AIDS)
- c. Upper respiratory tract infections
- d. Coagulation disorders (hemophilia)
- e. Systemic inflammatory response syndrome (SIRS, sepsis)

8. Bacteria such as *Mycobacterium tuberculosis* have acquired the capacity to inhibit phagosome-lysosome fusion. What is a consequence of this? 1
- Reduced likelihood that peptides will be expressed at the cell surface
 - Fewer peptides are available to bind to class I MHC
 - Reduced number of class I MHC molecules available to display peptides to CD8+ lymphocytes
 - Reduced number of class I MHC molecules available to display peptides to CD8+ lymphocytes
9. The different types of professional antigen presenting cells influence antigen uptake, constitutive MHC expression, and co-stimulatory activity. Which of the following is true? 1
- Dendritic cells constitutively express a high level of class II MHC molecules and co-stimulatory activity, they can activate naïve T cells.
 - Macrophage must be activated by phagocytosis of particular antigens before they express class II MHC molecules or co-stimulatory B-47 membrane molecules
 - B cells constitutively express class II MHC molecules but must be activated before they express the co-stimulatory signal
 - All of the Above
10. The chaperone is associated with free class I α chain facilitate its folding and release after binding to β 2 macroglobulin is 1
- Calnexin
 - Calreticulin
 - Tapasin
 - Ubiquitin
11. Which of the following mechanism is involved in the internalization of antigen by B cells? 1
- Pinocytosis
 - Phagocytosis
 - Receptor-mediated endocytosis
 - All the above
12. Which of the following is not the characteristic feature of HLA DM? 1
- The HLA-DM is widely conserved among mammalian species
 - HLA is not polymorphic
 - HLA DM is present in the endosome
 - HLA is present in the cell surface
13. Before loading of antigenic peptide, MHC molecules exist in, 1
- monomers of α and β chain

- b. dimers with an empty peptide-binding site
- c. Trimers with peptide binding site with class II-associated invariant peptide
- d. None of the above

14. Give 4 major differences between endocytic and cytosolic pathways

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