

一、解釋名詞(各3分)

1. FOXP3
2. Adjuvant
3. Monocyte
4. Chemokine
5. Epigenetics
6. Severe Combined Immunodeficiency (SCID) mice
7. Allelic exclusion (要舉例)
8. Defensin
9. Secretory component of IgA
10. Invariant chain
11. Innate immunity
12. Anergy
13. Th17
14. epitope

二、配合題:

pick up the right answer from the below list ( 單選, 共8分)

- \_\_\_\_\_ 1. IgG mediated
- \_\_\_\_\_ 2. IgE mediated
- \_\_\_\_\_ 3. serum sickness
- \_\_\_\_\_ 4. contact hypersensitivity by nickel
- \_\_\_\_\_ 5. tuberculin test reaction
- \_\_\_\_\_ 6. immune complex formation
- \_\_\_\_\_ 7. autoimmune hemolytic anemia
- \_\_\_\_\_ 8. anaphylaxis

- (A). Type I hypersensitivity
- (B). Type II hypersensitivity
- (C). Type III hypersensitivity
- (D). both Type II and Type III hypersensitivity
- (E). Type I, II and III hypersensitivity
- (F). Type IV hypersensitivity
- (G). all of the Type I, II, III and IV hypersensitivity
- (H). none of any type of hypersensitivity

見背面

三、單選題 (每題 2 分，共 10 分) ※ 本大題請於試卷內之「選擇題作答區」依序作答。

**1. Which of the following statements is FALSE?**

- A. TCR is allelically excluded on individual T cells.
- B. CD4 and CD8 co-receptors are also signal transducing molecules for T cell activation.
- C. The arrangement of  $\alpha$  chain gene segments most closely resembles that of  $\beta$  chain.
- D. The gene segments for the  $\alpha$  chain are interspersed with those for the  $\beta$  chain.

**2. ALL of the followings are true for reduction of CTL killing activity, EXCEPT:**

- A. absence of the gene for  $\beta 2$  microglobulin.
- B. absence of the gene for HLA DM.
- C. absence of the gene for perforin.
- D. presence of anti-CD8 antibodies.
- E. presence of monoclonal antibodies specific for multiple TCR  $V\alpha$  and  $V\beta$  specificities.

**3. The antigen specificity of Th activation by macrophages is enhanced by the**

- A. ability of each macrophage to present only specific epitopes to T cells.
- B. binding of T cell adhesion molecules only to macrophages presenting the antigen recognized by the T cell.
- C. specificity of CD4 binding to Class II MHC on the macrophage.
- D. upregulation of CD4 or CD8 co-receptors following antigen binding.
- E. upregulation of co-stimulatory molecules only on macrophages which have contacted foreign antigen

**4. A T cell which binds antigen without undergoing a co-stimulatory signal from an APC**

- A. becomes inactivated.
- B. can become a helper cell but not a killer cell.
- C. can get a co-stimulatory signal from a different APC
- D. dies.
- E. divides but doesn't make effector molecules.

**5. Bacterial polysaccharide vaccines are conjugated to proteins so that**

- A. the polysaccharide can act as an adjuvant to induce better immunity to the protein.
- B. the polysaccharide looks less like blood typing antigens to the immune system.
- C. the protein can act as an adjuvant to upregulate B7 expression on APC.
- D. the protein can stimulate T cell help for polysaccharide-specific B cells.
- E. none of the above.

四、填入適當的答案 (每格 3 分，共 15 分)

1. TCR signaling

(1) Upon antigen ligation with a T cell receptor, the cytoplasmic tails of CD3 complex molecules that are phosphorylated by Lck are called: ① \_\_\_\_\_

(2) A tyrosine kinase which activates PLC- $\gamma$  and cleaves phosphatidylinositol 4,5-bis phosphate (PIP<sub>2</sub>) into diacylglycerol (DAG) and inositol triphosphate (IP<sub>3</sub>) is called ② \_\_\_\_\_

2. Toll-like receptor (TLR) signaling are sorted by adaptor protein (or proteins) that is recruited (or are recruited) in signaling pathway. For example:

(1) when TLR4-MD2 complex is engaged with its ligand on the cell surface recruits ③ \_\_\_\_\_ (which adaptor) and MyD88 to activate MyD88 dependent pathway.

(2) The complex may be internalized and trafficked to endosome where it recruits ④ \_\_\_\_\_ and ⑤ \_\_\_\_\_ adaptors and activate MyD88-independent pathway.

五、解釋名詞 (每題 2 分)

1. Hybridoma
2. Mast cells
3. Mucosal tolerance
4. Antibody isotypes
5. Pattern-recognition receptor
6. Adhesion molecules
7. Regulatory T cells
8. Phagocytosis

六、問答題

1. (3 分) It required by law that children are to receive diphtheria-tetanus-pertussis vaccination (DTP, 白喉、破傷風、百日咳疫苗) starting two-months of age and repeatedly at four-month, six-month, one-and-a-half year and six-year of age. Please describe the content of the vaccine and explain why there is a need for repeated immunization.
2. (3 分) Chemokines are small proteins that have specialized functions. Please indicate (i) the functions of chemokines, (ii) the grouping of chemokines, and the basis for such grouping, (iii) the characteristics of their receptors.
3. (3 分) There are three known complement activation pathways. Please (i) name all these three pathways, and (ii) explain how their initiations are different. These three pathways converge to generate the same sets of effector molecules. (iii) What are these three sets of effector molecules? (iv) How do they work to eradicate pathogens?