

一、選擇題 ※ 本大題請於試卷內之「選擇題作答區」依序作答。

(A) Multiple choices (maybe single choice, 2 points each)

1. X-linked severe combined immunodeficiency (X-SCID) is a disease that is usually fatal. If a mother is a carrier of X-SCID, what would be the probability of her kids to show symptoms of X-SCID?

- A. 100% for all baby girls
- B. 50% for all baby girls
- C. 0% for baby girls
- D. 100% for baby boys
- E. 50 % for baby boys

2. Which amino acids in a signaling molecule can be phosphorylated in response to stimulation?

- A. Tyrosine
- B. Aspartic acid
- C. Glutamic acid
- D. Threonine
- E. Histidine

3. Regarding antibody structure which statements are CORRECT?

- A. There are two light chains and two heavy chains in a IgG molecule
- B. There are three CDR regions in a IgG molecule
- C. There are two antigen binding sites in a IgG molecule
- D. There are two variable regions in a IgG molecule
- E. There are 8 constant regions in a IgG molecule

4. Regarding signal transduction of cytokine/chemokine receptors which statements are CORRECT?

- A. Cytokine receptors are all non-receptor tyrosine kinases
- B. Cytokine receptors usually use STAT proteins, which are tyrosine kinases, to initiate signaling events
- C. Suppressors of cytokine signaling (SOCSs) are negative regulators of cytokine signaling that are usually induced after stimulation
- D. The signaling pathways of cytokine receptors and chemokine receptors are different
- E. One chemokine may bind several chemokine receptors and one chemokine receptor may bind several chemokines

5. Regarding BCR and TCR which statements are CORRECT?

- A. Both receptors are rearranged at RNA levels during development
- B. BCR begins to rearrange at light chain
- C. TCR begins to rearrange at β chain
- D. RAG1 and RAG2 are involved in the rearrangement of both BCR and TCR genes
- E. Knockout of BCR gene in mice will result in the loss of B cells

見背面

6. Regarding T-independent (TI) and T-dependent (TD) antigen which statements are CORRECT?
- A. T stands for T cells
 - B. LPS belongs to TI-1 antigen
 - C. TD antigens can induce a better antibody response than TI antigens
 - D. Most of protein antigens are TD antigens
 - E. Infants cannot mount TI-2 response because the B cells that are responsible for TI-2 antigen are still immature

(B) single choice (2 points each)

7. Which cytokine secreted by Th cells can induce the production of IgA from activated human B cells?

- A. IL-4
- B. IFN
- C. TGF- β
- D. IL-7.

8. Which order of immunoglobulin genes rearrangement is correct?

- A. $V\kappa-J\kappa \rightarrow V\lambda-J\lambda \rightarrow D-J_H \rightarrow V_H-DJ_H$,
- B. $V_H-D \rightarrow V_H D-J_H \rightarrow V\kappa-J\kappa \rightarrow V\lambda-J\lambda$,
- C. $D-J_H \rightarrow V_H-DJ_H \rightarrow V\kappa-J\kappa \rightarrow V\lambda-J\lambda$,
- D. $V_H-D \rightarrow V_H D-J_H \rightarrow V\lambda-J\lambda \rightarrow V\kappa-J\kappa$.

9. Which type of B cells express surface IgD?

- A. mature B
- B. pro-B
- C. immature B
- D. pre-B.

10. Which kind of antibody can activate the complement system?

- A. IgD
- B. IgE
- C. IgG4
- D. IgM.

11. Which B cells are mainly located in the body cavity?

- A. conventional B-2 cells
- B. B-1 cells
- C. marginal zone B cells
- D. plasma cells.

二、解釋名詞

(2 points each)

1. Germinal center reaction
2. Affinity maturation
3. MHC restriction
4. Negative selection (during T or B development)

(3 points each)

5. Germinal center
6. Epitope
7. Passive immunization
8. Memory B cell
9. Fab fragment
10. Eosinophil
11. MYD88
12. FOXP3
13. Pathogen associated molecular pattern
14. Macrophage
15. Gnotobiotic mice
16. Central tolerance
17. CD3 complex

三、簡答題

1. Antibodies are becoming popular drugs in treating different diseases due to their high affinity and stability in the body. Please describe two applications and the potential mechanisms for using antibody as a therapeutic drug. (5 分)
2. 請由免疫反應的角度來說明，細菌(bacteria)感染和病毒(virus)感染時所引起的免疫反應會有那些異同點？(8 分)
3. 試比較四型過敏反應(hypersensitivity)的異同點，並分別舉出該型過敏反應的代表臨床表現(8 分)。
4. 有關疫苗的製備，請簡單回答下列問題：
 - 1)在製備疫苗時，會加入佐劑(adjuvants)，請問加入佐劑的主要目的為何？(4 分)
 - 2)請舉出三種不同的佐劑，並說明這些佐劑的功能和機轉為何。(6 分)

試題隨卷繳回