

一、Multiple choices (maybe single choice, 2 points each) ※ 本大題請於試卷內之「選擇題作答區」依序作答。

1. Which are antigen receptors of the innate immunity?
 - A. MHC
 - B. Toll-like receptor
 - C. B cell receptor
 - D. Nod-like receptor
 - E. Fc receptor

2. Which are immunological organs or tissues?
 - A. Peyer's patches
 - B. Bone marrow
 - C. Liver
 - D. Tonsil
 - E. Intestine

3. Which diseases are immune-related diseases?
 - A. Allergy
 - B. Stroke
 - C. Type 1 diabetes
 - D. Asthma
 - E. Systemic lupus erythematosus (SLE)

4. Regarding dendritic cells (DC) which statements are **NOT CORRECT**?
 - A. They are one component of the adaptive immunity
 - B. They are the most potent antigen presenting cells
 - C. They are distributed throughout the body
 - D. Conventional DCs (cDCs) have the greatest ability to produce type I interferon upon stimulation
 - E. Dr. Steinman was awarded to the Nobel prize due to the discovery of DCs

5. Which immune cells are phagocytes?
 - A. T cells
 - B. B cells
 - C. Neutrophils
 - D. Macrophages
 - E. Dendritic cells

6. Cytokines
 - A. are molecules mainly induced in and secreted by immune cells
 - B. can only work on neighboring cells but not on producers themselves
 - C. can transduce signals through JAK-STAT pathways
 - D. One cytokine has only one function and the functions of different cytokines are not overlapping
 - E. are very important regulators for immune response

7. Regarding antibody which statements are **NOT CORRECT**?
 - A. It is composed of one heavy chain and one light chain
 - B. Both heavy chain and light chain have variable and constant regions and the antigen binding ability is determined by the constant regions
 - C. B cell receptor is actually a surface IgM
 - D. Generation of isotype antibodies such as IgM and IgG are mediated by two processes, namely class switching recombination and somatic hypermutation
 - E. The avidity of IgM is greater than IgG

見背面

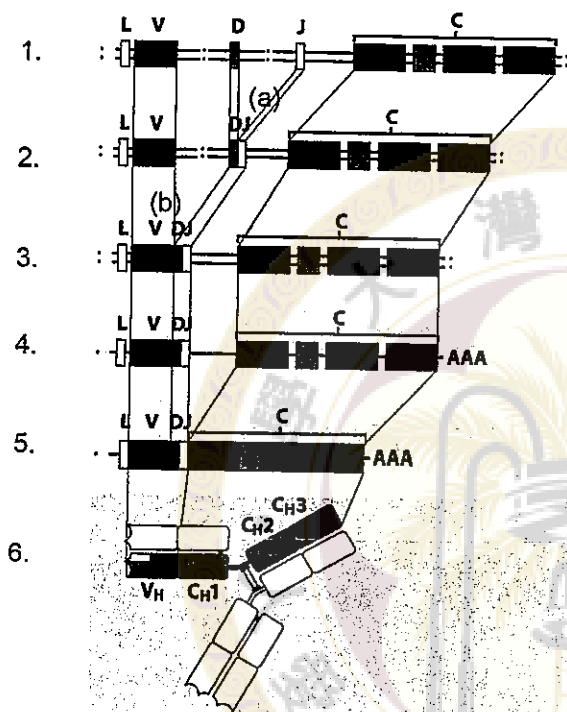
8. Regarding T cell differentiation which statements are **NOT CORRECT**?
- A. Both Naïve CD4 and CD8 T cells can be differentiated into Th1, Th2, Th17 and Treg upon stimulation
 - B. Differentiated helper T cells may regulate antibody production by B cells
 - C. Th1 cells are important for eliminating virus infection
 - D. Treg cells are positive regulators for immune response
 - E. Depletion of Th2 cells will lead to autoimmunity
9. A germinal center is
- A. where activated B cells undergo massive apoptosis and proliferation
 - B. divided into dark zone where B cells undergo affinity maturation and light zone where B cell undergo proliferation
 - C. where helper T cells activate B cells
 - D. where activated B cells differentiate into memory B cells
 - E. important for B cells to undergo Ig class switch
10. Humoral immunity include the following EXCEPT
- A. Antibody-dependent cellular cytotoxicity (ADCC)
 - B. Lysis of bacteria by C9 complex
 - C. Neutralization of viral entry by antibody
 - D. Opsonization of bacteria by C3b
 - E. Cytokine-mediated activation of T and B cells

二、解釋名詞(1-8 題，每題 3 分。9-13 題，每題 2 分。)

- 1. nude mice
- 2. fluorescein isothiocyanate (FITC)
- 3. lymph nodes
- 4. innate immune cells
- 5. neutrophil extracellular trap
- 6. opsonization
- 7. adoptive transfer
- 8. chemokines
- 9. Tfh cell
- 10. Germinal center
- 11. Epitope
- 12. Passive immunization
- 13. Allelic exclusion

三、簡答題

1. Please answer the following questions accordingly.



- Which molecules (1-6) in the above figure are RNA (2 points)?
- Which kind of reaction occurs in (a) and (b) in the above figure (2 points)?
- List two important proteins for carrying out the reaction in the above answer (2 points)?
- If your samples contain two lineages of cells (ex: endothelial cells and B cells), please design experiments to distinguish which type of cells carry the genomic configuration for 1 or 3 in the above figure (5 points).
- Which antibody isotype can cross the placenta (2 points)?
- What is the most abundant antibody isotype in blood (2 points)?

2. Essay (5 points)

Please compare the differences between the innate and adaptive immune response (3 points). Which response is more important for the host to defend against pathogens? Please give your explanations (2 points).

3. 今年 A 型流感在春節的流行已經引起許多台灣民眾的感染，各家醫院的急診和門診都是大爆滿。

針對流感，請簡單回答下列問題：(15 分)

- 請簡單說明人類的免疫系統如何來對抗這些流感？(5 分)
- 所以對那些接受流感疫苗接種的人，在面對流感病毒感染時有何好處(3 分)？為什麼流感疫苗每年都需要重新接種一次(2 分)？

見背面

- 3) 疫苗誘發的免疫反應與自然感染的免疫反應有哪些差異性(5分)?
4. 我們知道愛滋病病毒主要感染 CD4 陽性的 T 細胞，會造成患者的免疫缺陷，請簡單回答下列問題 (11分)：
- 1) CD4 陽性的 T 細胞受到愛滋病病毒感染後為什麼會造成免疫缺陷(5分)?
 - 2) 這幾年來，CD4 陽性的 T 細胞已經依照其功能和特定的細胞激素分泌分成好幾種不同的型別，請舉出三種不同的 CD4 陽性 T 細胞，並簡單說明其特徵和功能(6分)。

