※ 注意：請於答案卷上標明題號，並依序作答。

1-10 題是非題，每題 2 分。

1. 巨噬細胞和 NK 細胞在某些特定狀況均能夠分泌 IFN-γ。

2. 大多數的 $CD4^+$ T 細胞能夠辨識受 MHC II 所限制的抗原，但是有少數的 $CD4^+$ T 細胞卻會認識受 CD1 所限制的抗原。

3. 大多數的 T cell receptor complex 是由α、β、CD3ε、CD3δ、CD3γ、CD3ζ 六種不同蛋白組成，但只有 CD3ε、CD3γ 和 CD3ζ具有 itim motif。

4. IFN-γ會抑制 TH2 effector 細胞的分裂。

5. 記憶型 T 淋巴細胞比從未接觸過抗原的 naive T 細胞表現較高量的 CD44 以及 LFA-1(CD11a)。

6. IL-2、IL-4、IL-7、IL-10 均具有促使 T 細胞分裂的活性。

7. 雖然 T 淋巴細胞之 T 是 thymus（胸腺）的縮寫，少數 T 淋巴細胞的發育並不需要胸腺。

8. 經由 TNFR（TNF 受體）分子的訊息傳遞可以增強 IFN-γ對於巨噬細胞的活化作用。

9. 人類血中所含 IgG1 和 IgG3 抗體之濃度大約相似。

10. 只有少數（少於 10%）的胸腺細胞會完成發育而離開胸腺。

11-30 單選題(One point each)

11-14.由(A)~(E)選擇適當答案

	B lymphocyte	T lymphocyte
Location of origin	11._____	12._____
Location of maturation	13._____	14._____

(A) Bone marrow
(B) Liver
(C) Lymph node
(D) Spleen
(E) Thymus.

15-18. 由(A)~(F)選擇適當答案

	T helper 1	T helper 2
Main cytokine secreted	15._____	16._____
Role	17._____	18._____

(A) IL4 and IL5
(B) IFNα
(C) IFNγ
(D) Macrophage activation
(E) B-cell activation
(F) Antigen presentation

接背面

19-24. 由(A)~(I)選擇適當答案

	Development of T lymphocytes	
	Positive Selection	Negative Selection
Mediator	19._____	20._____
Binding strength	21._____	22._____
Function	23._____	24._____

(A) Bone marrow-derived APC
(B) Hassall's corpuscles
(C) Cortical epithelial cells
(D) Weak
(E) Strong
(F) Innate immunity
(G) Adaptive immunity
(H) Central tolerance
(I) MHC restriction.

25. Immediate hypersensitivity (Type I) is an immune reaction initiated by antigen binding to:

(A) IgA,
(B) **IgE,**
(C) **IgG1,**
(D) **IgG2a,**
(E) **IgM,**

which pre-attached to mast cells or basophiles.

26. An immune reaction that is unresponsiveness to an antigen induced by the expression of specific lymphocytes to that antigen:

(A) Hypo-sensitivity
(B) Suppression
(C) Anergy
(D) Tolerance
(E) Ignorance

27. Which event is **not** happening during the maturation of T lymphocytes?

(A) Down-regulation of CD3
(B) Somatic recombination
(C) Expression of TCR on cell surface
(D) Up-regulation of co-receptor, e.g. CD4 or CD8
(E) Negative selection

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28. A method is used to determine the relative quantity and size of RNA.
(A) Eastern blot
(B) Far-Western blot
(C) Northern blot
(D) Southern blot
(E) Western blot

29. Which is **not** true for NK cells?
(A) A subset of bone marrow-derived lymphocytes
(B) Express Ig receptors
(C) Activation is regulated by a combination of cell surface stimulatory and inhibitory receptors
(D) Secret IFNγ
(E) Kill microbe-infected cells by direct lytic mechanisms

30. Which is **not** true for cytotoxic T lymphocytes?
(A) Target and kill host cells infected with viruses or intracellular microbes
(B) Express CD8 on cell surface
(C) Recognize microbial peptides displayed by MHC II
(D) Secret perforin and granzymes
(E) Induce apoptosis of target cells through FasL-Fas interaction

31. How many CDRs are present in a T cell receptor (TCR) molecule? _____; and how many of them are same? _____ (4 分)

32. When a mutation is introduced into MHC class II region leads to disruption of genes, which of the following function could be impaired? （複選，也可能只有一個答案）(4 分)
(A) MHC class I antigen presentation
(B) MHC class II antigen presentation
(C) Expression of MHC class I molecule
(D) Expression of MHC class II molecule
(E) synthesis of invariant chain

接背面

33. 配合題: pick up the right answer from the list below. (單選, 共 12 分)

_____ (1) TAP
_____ (2) DM
_____ (3) PGYAVEDGGMLL peptide
_____ (4) discovery of MHC restriction
_____ (5) CLIP
_____ (6) RAG-1

(A) MHC class I antigen presentation
(B) MHC class II antigen presentation
(C) Both MHC class I and II antigen presentation
(D) antigen binding sites in T cell receptor (TCR)
(E) NK cell receptor
(F) S. Tonegawa
(G) G. Snell
(H) P. Doherty
(I) Initiate the cutting of recombination sequence-specific DNA cleavage during Ig gene rearrangement
(J) affinity maturation
(K) generation of memory cells

34. **(A)** What is MHC restriction? (5 points) **(B)** Please give one example to show the importance of MHC restriction in regulating immune response. (5 points)

35. **(A)** What is a costimulatory molecule? (5 points) **(B)** What is the biological significance of costimulatory molecules in immune response? (5 points)

36. There are three known complement activation pathways. **(A)** Please list all three and describe how each pathway is initiated. **(B)** What are the outcomes of complement activation? (5 points)

37. **(A)** How does innate immune system recognize pathogens? **(B)** Please compare and contrast the characteristics of receptors of innate and adaptive immune systems. (4 points)

38. **(A)** What are the immunological principles of vaccination? **(B)** Why is it necessary for a child to receive more than one inoculation of the same vaccine? (4 points)

39. Enzyme-linked immunosorbent assay (ELISA) is widely used in immunology and medicine. Please explain the principle of this assay. (3 points)

40. What are the different functions of peripheral and central lymphoid organs? (4 points)