

一、配合題 ※ 注意：請於試卷內之「非選擇題作答區」依序作答，並應註明作答之部份及題號。

1. Match the term in Column A with its description or function in Column B.

(每格 2 分，共 10 分)

Column A	Column B
__ a. Invariant chain	1. degrades cytosolic proteins
__ b. HLA-DM	2. can transport cytosolic peptides into the endoplasmic reticulum
__ c. TAP1, TAP2	3. catalyzes the release of unstably bound peptides from MHC Class II molecules
__ d. Proteasome	4. is present late in the endosomal pathway where MHC Class II binds antigen peptides
__ e. MHC Class II compartment	5. binds to newly synthesized MHC Class II and blocks the peptide binding groove

二、單選題： ※ 注意：請於試卷內之「選擇題作答區」依序作答。

(一)每題 1 分，共 15 分

1. The _____ is the lymphoid organ that filters the blood.
 - A) spleen
 - B) tonsils
 - C) Peyer's patches
 - D) appendix
 - E) adenoids
2. Which of the following characteristics is common to both T-cell receptors and immunoglobulins?
 - A) Somatic recombination of V, D, and J segments is responsible for the diversity of the receptor.
 - B) Class switching enables a change in effector function.
 - C) The antigen receptor is composed of two identical heavy chains and two identical light chains.
 - D) Carbohydrate, lipid, and protein antigens are recognized and stimulate a response.
 - E) They are secreted from the cells.
3. When comparing the T-cell receptor α (alpha)-chain locus with the immunoglobulin heavy-chain locus, all of the followings are correct except

見背面

- A) the T-cell receptor α (alpha) locus differs because it has embedded within its sequence another locus that encodes a different type of T-cell receptor chain
- B) both are encoded on chromosome 14
- C) the T-cell receptor α (alpha)-chain locus does not contain D segments
- D) the T-cell receptor α (alpha)-chain locus contains more V and J regions
- E) the T-cell receptor α (alpha)-chain locus contains more C regions
4. All of the following are primarily associated with CD4 T-cell function except:
- A) improve phagocytic mechanisms of tissue macrophages
- B) assist B cells in the production of high-affinity antibodies
- C) kill virus-infected cells
- D) facilitate responses of other immune-system cells during infection
- E) assist macrophages in sustaining adaptive immune responses through their secretion of cytokines and chemokines
5. Which of the following is not a characteristic of native antigen recognized by T cells?
- A) peptides ranging between 8 and 25 amino acids in length
- B) not requiring degradation for recognition
- C) amino acid sequences not found in host proteins
- D) primary, and not secondary, structure of protein
- E) binding to major histocompatibility complex molecules on the surface of antigen-presenting cells
6. Which of the following statements regarding CD8 T cells is incorrect?
- A) When activated, CD8 T cells in turn activate B cells.
- B) CD8 is also known as the CD8 T-cell co-receptor.
- C) CD8 binds to MHC molecules at a site distinct from that bound by the T-cell receptor.
- D) CD8 T cells kill pathogen-infected cells by inducing apoptosis.
- E) CD8 T cells are MHC class I-restricted.
7. MHC molecules have promiscuous binding specificity. This means that
- A) a particular MHC molecule has the potential to bind to different peptides
- B) when MHC molecules bind to peptides, they are degraded
- C) peptides bind with low affinity to MHC molecules
- D) MHC Class I and Class II bind different peptides
- E) none of the above describes promiscuous binding specificity
8. Which of the following contributes to the activation of naive T cells?
- A) neutrophils
- B) B cells

- C) macrophages
 - D) dendritic cells
 - E) basophils
9. Macrophages exhibit all of the following characteristics except:
- A) they trap and degrade pathogens in secondary lymphoid organs
 - B) they deliver co-stimulatory signals to naive T cells needed for T-cell priming
 - C) they migrate from sites of infection to nearby secondary lymphoid organs
 - D) they remove and degrade apoptotic lymphocytes from secondary lymphoid tissues
 - E) they reside in both the cortex and medulla of lymph nodes
10. Which of the following statements regarding neutrophils is false?
- A) Neutrophils are mobilized from the bone marrow to sites of infection when needed.
 - B) Neutrophils are active only in aerobic conditions.
 - C) Neutrophils are phagocytic.
 - D) Neutrophils form pus, which comprises dead neutrophils.
 - E) Dead neutrophils are cleared from sites of infection by macrophages.
11. Activated T cells express _____, which binds to B7 with 20 times higher affinity than CD28 and results in _____ of T-cell activity and proliferation.
- A) high-affinity IL-2 receptor; stimulation
 - B) CD40L; suppression
 - C) VLA-4; stimulation
 - D) CTLA-4; suppression
 - E) CTLA-4; stimulation
12. All of the following are correctly matched except:
- A) Th1: T-bet
 - B) Treg: FoxP3
 - C) IL-12: dendritic cells
 - D) Th17: ROR γ (gamma)T
 - E) Th2: Bcl6
13. All of the following statements refer to regulatory T cells except:
- A) they produce anti-inflammatory cytokines
 - B) they express elevated levels of CD25
 - C) they express FoxP3
 - D) they enhance the production of new effector T cells

E) they suppress the function of existing T cells

14. The area of contact between membranes of a T cell and an antigen-presenting cell where a clustering of protein-protein interactions occur is called a(n)

- A) immunoreceptor tyrosine-based activation motif (ITAM)
- B) polarization
- C) cross-presentation center
- D) granuloma
- E) immunological synapse

15. Severe combined immune deficiency (SCID) describes a condition in which neither _____ nor _____ are functional.

- A) classical; alternative pathways of complement
- B) T-cell-dependent antibody responses; cell-mediated immune responses
- C) innate; acquired immune responses
- D) MHC class I; MHC class II molecules
- E) the thymus; the bone marrows

(二) 單選題：每題 3 分，共 18 分。

16. Which one is a type of innate immune cell :

- A) mast cell
- B) basophil
- C) NK cells
- D) all right above

17. Which one is not the application of monoclonal antibody :

- A) ELISA
- B) Southern blot
- C) Western blot
- D) FACS

18. Which one is not a kind of immunotherapy :

- A) dendritic cell vaccine
- B) antibiotics
- C) T cell transfer
- D) drug-conjugated antibody

19. Which statement is true about MHC class I and II pathways:

- A) Both pathways are required for T cell activation
- B) Both pathways need proteasome

- C) Both pathways present same size of peptides
- D) Both pathways do not need CLIP

20. Which one is not involved in innate immunity :

- A) Toll-like receptor
- B) complement
- C) T cell receptor
- D) C-type lectin receptor

21. Which one is the discovery in 2011 Nobel Prize in medicine :

- A) TLR
- B) Toll
- C) dendritic cell
- D) all of the above

三、解釋名詞 (每題 2 分)

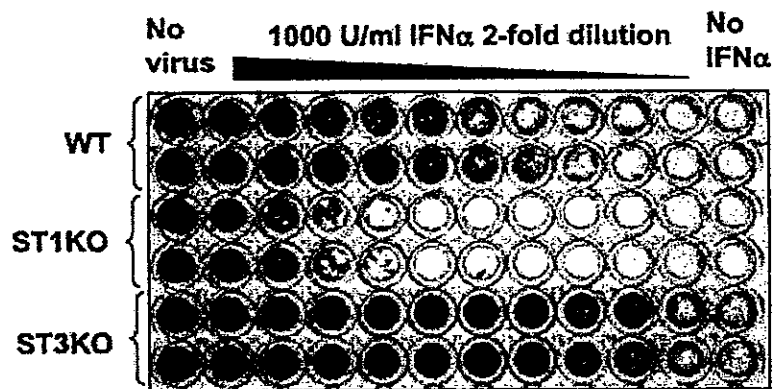
1. Innate immune cells
2. IgE
3. Thymus
4. Major Histocompatibility Complex
5. Epigenetic modification
6. Autologous antigens
7. Immunohistochemistry staining
8. Flow cytometry
9. Western Blot analysis
10. Ion exchange chromatography
11. Annexin V
12. Confocal microscope

四、問答題

1. 王建民不小心在滑壘的過程中擦傷了左腳，回到選手村後開始腫漲發熱。這時防護員看到之後說：你受傷的部分已經開始發炎 (inflammation) 了。請簡述防護員所說的發炎反應的過程。(7 分)
2. What are cytokines? Please describe their properties and functions. (6 points)
3. What are cytokine receptor-mediated JAK-STAT pathways? Please describe as thorough as possible from binding of a cytokine to its receptors. (5 points)

見背面

4. IFN α is a very important cytokine in antiviral response during virus infection in cells and hosts. To study the role of STAT1 (ST1) and STAT3 (ST3), two signal mediators of IFN α , in antiviral response, WT, STAT1 knockout (ST1KO) or STAT3 knockout (ST3KO) mouse embryonic fibroblasts (MEFs) were used in antiviral assay. The cells in a 96-well plate were first treated with or without a 2-fold dilution of IFN α (the symbol \blacktriangle indicates the concentration of IFN α from high to \blacktriangle low) for overnight to induce antiviral response. The treated cells were then infected with a virus that has a killing activity in cells. After viral infection for 24 hours, the remaining cells were visualized with a dye and the results are shown in the figure. (A) Please summarize the results, particularly the role of STAT1 and STAT3 in IFN α -induced response. (5 points) (B) It appears that the role of STAT1 and STAT3 are different. Please explain why cells would evolve a system in which signal molecules have different roles. (5 points) (C) Based on these results, please ask a question and design experiments accordingly to further investigate the mechanisms of IFN α -induced antiviral response. (5 points)



試題隨卷繳回