

MULTIPLE CHOICE: Pick the best answer – 2 points each

1. L-selectin expression on naïve T cells is responsible for homing to:
  - a. Lymph node
  - b. Mucosa
  - c. Thymus
  - d. Bone marrow
2. Which would you expect to be more responsive to IL-2?
  - a. Naïve T cell
  - b. Activated T cell
3. What is the result of ligation of the TCR without costimulation?
  - a. T cell activation
  - b. Anergy
  - c. Apoptosis
  - d. Development of Th2 response
4. Th1 cells recognize
  - a. Peptide + MHC Class I
  - b. Peptide + MHC Class II
  - c. Endogenous antigens
  - d. Polysaccharides
5. Th2 cells are most effective at promoting
  - a. Cell mediated immunity
  - b. Neutrophil activation
  - c. CTL activity
  - d. Humoral immunity
6. Killing of bystander cells common for CTLs.
  - a. True
  - b. False
7. Cells killed by CTL die by
  - a. Apoptosis
  - b. Necrosis
8. CD4+ T cells activated in the presence of high levels of IL-6 differentiate into
  - a. CTL
  - b. Th1
  - c. Th2

- d. Th17
9. IFN- $\gamma$  production is characteristic of what T cell subset?
- a. T<sub>reg</sub>
  - b. Th1
  - c. Th2
  - d. Th17
10. What is the function of CTLA-4?
- a. Costimulation
  - b. Suppression of T cell function
  - c. Activation of macrophages
  - d. Activation of B cells
11. Which T cell subset would be most protective against infection with an intracellular pathogen?
- a. T<sub>reg</sub>
  - b. Th1
  - c. Th2
  - d. Th17
12. B cell responses to which of the following types of antigen would require T cell help?
- a. Proteins
  - b. Thymus independent antigens
  - c. TI antigens
  - d. Bacterial polysaccharides
13. Which of the following immune events is least likely to occur in a germinal center?
- a. Class switching
  - b. T cell help
  - c. CTL degranulation
  - d. Generation of memory B cells
14. The presence of which of the following cytokines during activation of a naïve T cell would skew the cell toward a T<sub>H</sub>2 phenotype?
- a. IL-2
  - b. IL-4
  - c. IFN- $\gamma$
  - d. IL-12
15. An deficiency in CD40 would result in abnormally high levels of
- a. IgG
  - b. IgM

- c. IgA
  - d. CD4+ T cells
16. Which of the following responses would be least protective during an intestinal helminth infection?
- a. Epithelial cell shedding
  - b. Mast cell degranulation
  - c. Mucous formation
  - d. Macrophage activation
17. The affinity of antibodies \_\_\_\_\_ during secondary responses to antigen
- a. Increases
  - b. Decreases
18. After a primary immune response to a given antigen, the number of circulating T cells specific for that antigen returns to baseline
- a. True
  - b. False
19. Effector and memory T cells differ in their expression of
- a. T cell receptor
  - b. IL-7 receptor
  - c. MHC
  - d. B7
20. In the mucosa, intraepithelial lymphocytes (IELs) are primarily
- a. B cells
  - b. Th1 cells
  - c. Th2 cells
  - d. CD8 cells
21. The primary function of M cells is to
- a. Secrete mucous
  - b. Transport antigen across the epithelium
  - c. Destroy antigen
  - d. Suppress T cell responses
22. The lamina propria is found in:
- a. The lymph node
  - b. The thymus
  - c. The intestine
  - d. The spleen

23. Which of the following isotypes of antibodies is found most often at mucosal surfaces?
- IgM
  - IgG
  - IgA
  - IgE
24. The hygiene hypothesis purports that allergy has increased in industrialized countries due to:
- Increased pollution
  - Increased levels of infection
  - Decreased levels of infection
  - Increased Th1 responses
25. X-linked immunodeficiencies are seen most often in
- Males
  - Females
26. Untreated HIV infection results in:
- Autoimmune disease
  - Increased rates of infection
  - Hyperproliferation of CD4<sup>+</sup> T cells
  - Decreased rates of infection
27. Treatment of HIV with a single drug is often ineffective because
- The virus mutates rapidly
  - Coinfection with other strains of HIV is common
  - Single drugs have a short half-life
  - HIV acquires drug-resistance plasmids
28. Activation of naïve T cells occurs in
- Peripheral tissue
  - Thymus
  - Lymphoid tissue
  - Bone marrow
29. What cell type has been proposed to be the source of the cytokine required to skew CD4<sup>+</sup> T cells to a T<sub>H</sub>2 phenotype?
- Macrophages
  - NK cells
  - Dendritic cells
  - NK T cells

## RESEARCH MINUTE QUESTIONS

30. Peyer's patch deficiency results in decreased levels of what antibody isotype upon *Salmonella* infection?
- IgM
  - IgG
  - IgA
  - IgE
31. Immunization \_\_\_\_\_ adjuvant results in enhanced memory responses to tumor antigens
- With
  - Without
32. CD4<sup>+</sup> T cells are primed in the \_\_\_\_\_ during *Helicobacter pylori* infection.
- Spleen
  - Peyer's patch
  - Bone marrow
  - Thymus
33. Memory responses differ from primary immune responses in a number of important properties. Name three ways in which they differ and describe the underlying mechanisms in each case. (6 points)

34. Which of the antibody classes mainly activates mast cells? How does it do so and what are the results? Which type of pathogen is this class of antibody mainly directed against? What unwanted reaction is this antibody also responsible for? (4 points)

35. Consider the claim “T-cell effector functions are primarily mediated by secreted products.” (a) To what extent is this statement true for CD4 cells and CD8 T cells? (b) Describe the roles of T-cell membrane-bound effector molecules in the immune response (10 points)