Ahmedabad University

School of Arts and Sciences

BIO201 Immunology

End Semester Examination 2023 (Winter Semester 2023)

Total Marks = 60 **Time – 1 hour**

Date: 29-04-2023
No. of printed pages: 8

1. AID scans switch region along with RNA polymerase and converts cytidine into _____ residues.

2. _____ act as switch factors, which play major roles in determining the particular immunoglobulin class that is expressed as a consequence of switching.

A. DNA flanking sequences
B. Multiple copies of short repeats
C. Cytokines
D. None of the above

3. The decision of which antibody isotype would be made is dependent on _____.

A. Interleukins
B. Interferons
C. Tumor necrosis facto
D. Could be all of the above

4. Define autoimmunity.

5. In autoimmune disorders, the immune system produces antibodies to an endogenous antigen (autoantigen). Several mechanisms may account for the body's attack on itself. Which of the following conditions results from a chemical alteration of autoantigens?

A. UV light–induced photosensitivity
B. Drug-induced hemolytic anemia
C. Persistent infection
D. An autoimmune disorder resembling SLE

6. In an autoimmune disorder, antibodies attack:

A. Only certain organs
B. Multiple organs
C. Both A and B
D. Does not affect organs

7. For each of the following autoimmune diseases (a–j), select the most appropriate characteristic (1–13) listed below.

Diseases a. Goodpasture's syndrome b. Graves' disease c. Systemic lupus erythematosus (SLE) d. Insulin-dependent diabetes mellitus (IDDM) e. Rheumatoid

arthritis f. Hashimoto's thyroiditis g. Myasthenia gravis h. Pernicious anemia i. Multiple sclerosis j. Autoimmune hemolytic anemia (5)

Characteristics (1) Auto-antibodies to intrinsic factor block vitamin B12 absorption (2) Auto-antibodies to acetylcholine receptor (3) TH1-cell reaction to thyroid antigens (4) Auto-antibodies to RBC antigens (5) T-cell response to myelin (6) Auto-antibody to IgG (7) Auto-antibodies to basement membrane (8) Auto-antibodies to DNA and DNA-associated protein (9) Auto-antibodies to receptor for thyroid-stimulating hormone (10) Induced by injection of acetylcholine receptors (11) TH1-cell response to pancreatic beta cells

8. State true or false: (2)

a. The avidity of an antibody is a better measure of its binding capacity within biological systems

b. Because Ag-Ab interactions are weak by nature, a large number of such interactions are required to form a strong Ag-Ab interaction

9. In the indirect ELISA test the enzyme-linked antibody will attach to

A. The patient's antigen
B. The variable region of the patient's antibody
C. The constant region of the patient's antibody
D. The wall of the microtiter well

10. The direct ELISA test requires:

A. Known antibody
B. Known antigen
C. Complement
D. Patient antibody

11. Place the following reactants in their proper order for the indirect ELISA test

1= enyme-linked antibody
2= know antigen
3= patient serum
4= substrate

A. 2 4 1 3
B. 3 2 1 4
C. 1 4 3 2
D. 4 1 3 2
E. 2 3 1 4

12. State true or false: (2)

In the indirect ELISA test, the development of colour means the patient has the antibody being tested for

The direct ELISA test is used to test for the presence of specific antibodies in a patient's serum

13. Which technique is useful in determining whether a patient produces abnormally low amounts of one or more isotypes, characteristic of certain immunodeficiency diseases.

A. Radial immunodiffusion
B. Double immunodiffusion
C. Immunoelectrophoresis
D. All of the above

14. A sample of blood agglutinates in the presence of anti-B antibodies but not in the presence of anti-A antibodies. What is the blood type of this sample?

A. Type B
B. Type A
C. Type O
D. Type AB

15. Which of the following types of antibody is most effective in an agglutination test?

A. IgD
B. IgG
C. IgE
D. IgM

16. Which of the following is NOT an example of labeled antibody tests?

A. Immunodiffusion test
B. Fluorescent antibody test
C. Western blots
D. ELISA

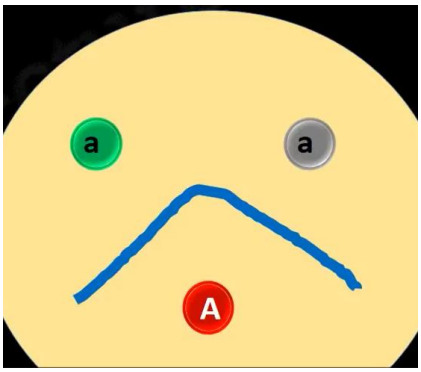
17. The complement system involves:

A. The production of antigens and antibodies
B. Serum proteins involved in nonspecific defense
C. A set of genes that distinguish foreign cells from body cells
D. The elimination of undigested remnants of microorganisms

18. After proteins are run on an SDS-PAGE gel, a transfer is executed. What is the purpose of the transfer in Western blot protocol?

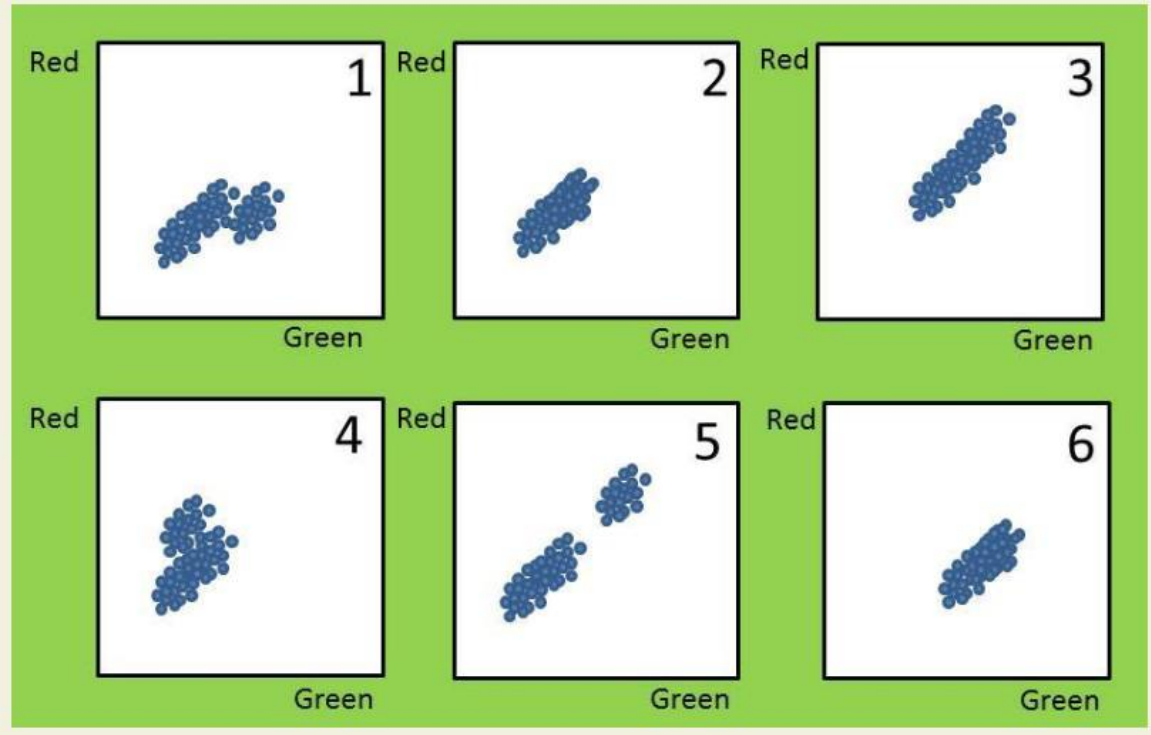
A. Visualize the proteins run on the gel
B. Probe the gel with an antibody to detect a protein of interest
C. Denature the proteins in the sample
D. Move proteins from the SDS-PAGE gel to a nitrocellulose membrane

19. What does the following result of double immunodiffusion represent?



A. Two antigens are identical
B. Two antigens are non-identical
C. Two antigens are partially identical
D. None of the above

20. You probe your cells with two different primary antibodies, one labelled with a red fluorophore and one with a green fluorophore. Plot 2 is your negative control. Which plot would indicate that a sub-population of your cells expressed the green protein but not the red protein?



A. Plot 1
B. Plot 4
C. Plot 6
D. Plot 3
E. Plot 5

21. In flow cytometry, which of the combination is impossible?

A. Both are labeled antigens in same particle
B. None of the labeled antigens on a particle
C. One labeled antigen
D. All can be true

22. An excess of antibody can inhibit agglutination reactions; this inhibition is called the _____.

23. The class II cytokine receptors possess the conserved _____ motifs.

24. IL-1Ra:

A. Bind to IL-1α
B. Binds to IL-1β
C. Binds to the IL-1 receptor
D. None of the above

25. Cytokines classified as _____ belong to the class I cytokine receptor family

26. IL-10 binds to:

A. Class I receptors
B. Class II receptors
C. Immunoglobulin superfamily receptors
D. None of the above

27. Give two differences between cytokines and hormones (2)

28. Indicate whether each of the following statements is true or false. (4)

a. A single molecule of bound IgM can activate the C1q component of the classical complement pathway.
b. The enzymes that cleave C3 and C4 are referred to as convertases.
c. C3a and C3b are fragments of C3 that are generated by proteolytic cleavage mediated by two different enzyme complexes.
d. MBL has a function in the lectin pathway analogous to that of IgM in the classical pathway, and MASP-1 and MASP-2 take on functions analogous to C1 components.

29. Deficiencies or defects in specific complement components have been linked to specific disorders. Defects in which of the following complements are linked to systemic lupus erythematosus?

A. C2
B. C3
C. C5
D. C9

30. MAC is

A. C5b6789
B. C5B5678
C. C5b5789
D. Protein polysaccharide

31. Which of the following is required for C1 activation?

A. Ca
B. Mg
C. Mn
D. Zn

32. Which of the following is the central molecule in complement pathway?

A. C1
B. C2
C. C3b
D. C5

33. In the classical pathway, after the proteolysis of the C3 complement pathway. Which component is cleaved by C4b2a3b and initiates the formation of membrane attack complex?

A. C5
B. C6
C. C7
D. C8

34. The membrane attack complex consists of five different complement proteins C5, C6, C7, C8, and C9.
Which of the following subunits bind to the surface and provide a binding site for a subsequent component?

A. C5a
B. C5b
C. C6a
D. None of the above

35. What is the initial complement component, bound by complement-fixing antibodies?

A. C1s
B. C1q
C. C3b
D. None of these

36. Regarding the complement pathway, which one of the following is the most accurate?

A. C3 convertase protects normal cells from lysis by complement.
B. C3a is a decay-accelerating factor and causes the rapid decay and death of bacteria.
C. In general, gram-positive bacteria are more likely to be killed by complement than gram-negative bacteria.
D. The membrane attack complex is formed as a result of activation of the classic pathway but not by activation of the alternative pathway.
E. The first time a person is exposed to a microorganism, the alternative pathway of complement is more likely to be activated than the classic pathway.

37. Of the following complement components, which one is the most potent in attracting neutrophils to the site of infection (i.e., acting as a chemokine)?

A. C1
B. C2
C. C3b
D. C5a
E. Mannan-binding lectin

38. State True or False (3)

A. Secretory IgG in mucous secretions plays an important role in host defence against viruses by blocking viral attachment to mucosal epithelial cells.
B. Some bacteria produce endotoxins such as LPS, which stimulate the production of cytokines such as TNF-α, IL-1, and IL-6 by macrophages or endothelial cells, which activates other macrophages.
C. The binding of TNF-α and TNF-β to NK cells induces lytic activity, making them effective in killing virus-infected cells.
D. Double-stranded *RNA* (dsRNA) molecules and other virus-specific structures are detected by one of several PAMP receptors, inducing the expression of interleukins.
E. Hepatitis C virus has been shown to overcome the antiviral effect of the interferons by blocking or inhibiting the action of PAMPs.
F. Antigenic variation among rhinoviruses, the causative agent of the common cold, is responsible for our inability to produce an effective vaccine for colds.

39. _____ is responsible for the attachment of the virus to host cells, binding to the sialic acid groups on host-cell glycoproteins and glycolipids.

40. What results in the emergence of a new subtype of influenza?

41. What does the strain A/Sw/Iowa/15/30 (H1N1) designate?

42. *Pseudomonas* secretes an enzyme, elastase, that inactivates both _____ and _____, thereby diminishing the localized inflammatory reaction.

43. How does the DPT vaccine protect against diphtheria? Explain in 1-2 sentences.

44. State true or false (1)

A. The inhaled Mycobacteria are ingested by alveolar macrophages in the lung and are able to survive and multiply intracellularly by inhibiting formation of phagolysosomes.
B. Upon *M. tuberculosis* infection, CTLs are activated within 2 to 6 weeks after infection and secrete cytokines that induce the infiltration of large numbers of activated macrophages.

45. The sporozoites of Plasmodium first attack

A. RBCs
B. Liver cells
C. Muscles
D. Intestine

46. **Match the organisms to their respective defense mechanisms (3)**

A. C. neoformans
B. Trypanosoma
C. Plasmodium

Pathogen defense mechanism

1. Duplication of the VSG gene and its transposition to a transcriptionally active expression site (ES)
2. CS surface antigens are sloughed off, thus rendering the antibodies ineffective
3. Production of a capsule, which blocks PRR binding