Dr.G.R.Damodaran College of Science

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CRISL rated 'A' (TN) for MBA and MIB Programmes

II MSC [2016-2018]
SEMESTER III
CORE: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY - 358B
Multiple Choice Questions.

1. Which one of the following statements regarding super-antigens is NOT true?
A. Staphylococcal toxic shock syndrome is an example of super-antigen associated disease.
B. Super-antigens are presented by antigen-presenting cells in an identical manner to conventional antigens.
C. Super-antigen associated diseases are characterized by markedly elevated circulating levels of pro-inflammatory cytokines.
D. Superantigens activate large numbers of B cells
ANSWER: D

2. A superantigen is a bacterial product that _____.
A. binds to B7 and CD28 costimulatory molecules.
B. binds to the b chain of TCR and MHC class II molecules of APC stimulating T cell activation
C. binds to the CD4 + molecule causing T cell activation
D. is presented by macrophages to a larger-than-normal number of T helper CD4 + proliferation
ANSWER: B

3. The circulating neutrophil to reach the site of inflammation, it must bind to blood vessel endothelial cell and then pass between the endothelial cells in a process called _____.
A. opsonization.
B. chemotaxis.
C. extravasation.
D. marginalization.
ANSWER: C

4. Which of the following is NOT a granulocytic cell?
A. Neutrophils.
B. Basophils.
C. Eosinophils.
D. Monocytes.
ANSWER: D

5. All of the following are secondary lymphoid organs EXCEPT _____.
A. spleen.
B. bone marrow.
C. lymph nodes.
D. mucosa associated lymphoid tissue.
ANSWER: B

6. All of the following are professional APC EXCEPT _____.
A. mast cells.
B. B cells
C. macrophages.
D. dendritic cells.
ANSWER: A

7. All of the following are true about neutrophils EXCEPT that _____.
A. are the main cells involve in acute inflammation
B. their granules involved in microbial killing.
C. are the cells of the adaptive immune system.
D. they have receptors for complement components and chemoattractive factors
ANSWER: C

8. Which one of the following statements is correct regarding T cells?
A. T cells can be subdivided into TH1 and TH2 subtypes only.
B. T cells alone can identify any type of antigen.
C. T cells express cell surface proteins denoted by cluster determinant (CD) numbers.
D. All T cells are involved in initiating the inflammatory response.
ANSWER: C

9. Which one of the following statements is NOT correct?
A. B cells have antibodies as their cell surface receptor.
B. There are five types of antibody.
C. IgE is an important antibody in allergies.
D. All B cells differentiate into plasma cells.
ANSWER: D

10. During phagocytosis, the metabolic process called respiratory burst involves the activation of _____.
A. oxidase
B. hydrolase.
C. peroxidase.
D. dehydrogenase.
ANSWER: A

11. Macrophage in the liver is called as _____.
A. kupffer cells.
B. alveolar macrophages
C. microglial cells.
D. histiocytes.
ANSWER: A

12. The hematopoietic cytokine, erythropoietin is produced by _____.
A. liver.
B. kidney.
C. pancreas
D. spleen.
ANSWER: B

13. Which one of the following is NOT related to hematopoiesis?
A. Liver.
B. Bone marrow.
C. Spleen.
D. Kidney.
ANSWER: D

14. Both the eye and the respiratory tract are protected against infections by which of the following?
A. the mucous membranes that cover their surface.
B. the secretion of complement proteins.
C. the release of slightly acidic secretions.
D. the secretion of lysozyme onto their surface.
ANSWER: D

15. The lymphoid progenitor cell gives rise to _____.
A. natural killer cells.
B. T-cell progenitor.
C. B-cell progenitor.
D. all the above.
ANSWER: D

16. Plasma cells do _____.
A. not have surface Ig markers.
B. not possess plasma cell antigen.
C. have surface Ig markers.
D. not produce antibody.
ANSWER: A

17. Exogenous antigen includes all of the following EXCEPT _____.
A. bacterial toxins.
B. extracellular protozoan parasites.
C. most bacteria.
D. viruses.
ANSWER: D

18. Class I MHC are found on _____.
A. B-cells and macrophages.
B. T cells only.
C. Neutrophils, T cells and B cells.
D. all nucleated cells.
ANSWER: D

19. Cells which have MHC Class II are _____, which present _____ antigen to TH cells.
A. antigen presenting cells, endogenous
B. antigen presenting cells, exogenous.
C. infected cells, inflammatory.
D. target cells, endogenous.
ANSWER: A

20. Endogenous antigen presentation requires delivery of antigen peptides to the endoplasmic reticulum by _____.
A. class I MHC and invariant chain.
B. calnexin and tapasin.
C. HLA-DM.
D. leader sequence.
ANSWER: A

21. Exogenous antigen is processed _____.
A. after presentation by antigen presenting cells.
B. by nearly every nucleated cell.
C. by the cytosolic processing pathway.
D. in acidified endosomes.
ANSWER: D

22. All of the following are true of antigen EXCEPT which one of the following?
A. They contain epitopes
B. They will react with antibodies.
C. They contain antigenic determinants.
D. They contain paratopes.
ANSWER: D

23. A molecule that can be covalently linked to a non-immunogenic antigen to make it an immunogen is

called as _____.
A. adjuvant.
B. carrier.
C. hapten.
D. mitogen.
ANSWER: C

24. Alum is an effective adjuvant because it _____.
A. disaggregates the antigen.
B. is immunogenic for stem cells.
C. is immunogenic for T cells.
D. slows the release of antigen.
ANSWER: D

25. Antibody cross-reactivity is demonstrated by antibody binding to _____.
A. a cell surface marker.
B. a hapten.
C. a hapten-carrier complex.
D. an antigen that is structurally similar to the immunogen.
ANSWER: D

26. The endogenous pathway of antigen presentation involves the presentation of antigen _____.
A. associated with MHC class II molecules.
B. to cytolytic T cells.
C. to Th2 cells.
D. to B cells.
ANSWER: A

27. The cross reactions may be due to the _____.
A. non- specific antibodies.
B. dissimilar epitopes on antigens.
C. similar epitopes on antigens.
D. chemical reactions with antigens.
ANSWER: C

28. Western blot is used to detect the specific _____.
A. RNA
B. double stranded DNA.
C. protein.
D. single stranded DNA.
ANSWER: C

29. The first immunoglobulin class produced in a primary response to an antigen is _____.
A. IgA.
B. IgG.
C. IgM.
D. IgE.
ANSWER: C

30. Which statement about the complement system is true?
A. These proteins are involved in innate immunity and not acquired immunity.
B. These proteins are secreted by cytotoxic T cells and other CD8 cells.
C. This group of proteins includes interferons and interleukins.
D. These proteins are one group of antimicrobial proteins acting together in cascade fashion.
ANSWER: D

31. Which action below is affected by an antihistamine?
A. blood vessel dilation.

B. phagocytosis of antigens.
C. MHC presentation by macrophages.
D. the secondary immune response.
ANSWER: A

32. The major histocompatibility complex proteins function to _____.
A. degrade T4 and T8 polypeptides.
B. . bind antibody for lymphokine production.
C. bind complement for cell lysis
D. bind antigen fragments for presentation to T-cells.
ANSWER: D

33. Adoptive immunotherapy with lymphokine activated killer cells (LAK) and tumor infiltrate (TIL) cells are characterized by_____.
A. nonspecific stimulation of effector cells.
B. expansion ex vivo of large numbers of lymphocytes
C. infusion with interleukin 2 (IL-2).
D. all the above.
ANSWER: D

34. The ligand for TCR is _____.
A. BCR.
B. MHC.
C. MHC + peptide.
D. peptide.
ANSWER: C

35. Antigen binding to B cells is most effective at sending an activation signal to the B cell if it causes _____.
A. antigen processing and presentation on Class II MHC.
B. BCR clustering.
C. BCR internalization.
D. inflammation.
ANSWER: B

36. An enzyme which puts a phosphate group on a protein molecule is called a _____.
A. co-receptor.
B. ITAM.
C. kinase.
D. phosphatase.
ANSWER: C

37. The signal transduction molecules associated with TCR are _____.
A. CD1.
B. CD3.
C. CD4.
D. CD8.
ANSWER: B

38. The signal transduction molecules associated with BCR are _____.
A. CD21 and CD81.
B. IgA and IgD.
C. IgD and IgM.
D. ITAMs and ITIMs.
ANSWER: B

39. The second messenger IP3 increases the cytoplasmic concentration of _____.
A. antigen.

B. calcium.
C. class I MHC.
D. phosphate.
ANSWER: B

40. DAG and IP3 are released from PIP2 by the action of _____.
A. adaptor protein.
B. phospholipase C (PLC).
C. protein kinase C (PKC).
D. small G protein.
ANSWER: C

41. Inflammatory responses may include which of the following?
A. clotting proteins migrating away from the site of infection.
B. increased activity of phagocytes in an inflamed area.
C. reduced permeability of blood vessels to conserve plasma.
D. inhibiting the release of white blood cells from bone marrow.
ANSWER: B

42. MBL activates the complement system via its ability to _____.
A. directly cleave C4.
B. directly cleave C2
C. directly cleave C3.
D. bind to C1q.
ANSWER: A

43. Cytotoxic T cells (CTL) are capable of recognizing _____.
A. peptide antigens associated with major histocompatibility complex (MHC) molecules.
B. membrane-bound antigens
C. cytoplasmic antigens.
D. all of the above.
ANSWER: D

44. Which one of the following cells is cytotoxic?
A. CD4 T cells.
B. CD8 T cells.
C. B cells.
D. T helper 1 or Th1 cells.
ANSWER: B

45. What are antigens?
A. proteins found in the blood that cause foreign blood cells to clump.
B. proteins embedded in B cell membranes.
C. proteins that consist of two light and two heavy polypeptide chains.
D. foreign molecules that trigger the generation of antibodies.
ANSWER: D

46. TC cells do not _____.
A. express CD8.
B. mediate killing of virus infected cells.
C. release lytic granules
D. recognize antigens with MHC class II molecules.
ANSWER: D

47. Cytokines may exhibit _____ action, signaling the cells that produce them.
A. paracrine.
B. auxocrine.
C. exocrine.

D. apocrine.
ANSWER: A

48. Cytokines are NOT _____.
A. antigen specific.
B. capable of activating more than one cell type.
C. made by lymphocytes.
D. small protein molecules.
ANSWER: A

49. Several cytokines may have the same effect on the cells they bind. This is an example of _____.
A. a cascade
B. antagonism.
C. pleiotropism.
D. redundancy.
ANSWER: D

50. Activated TC can regulate immune responses by signaling activated lymphocytes to undergo _____.
A. apoptosis.
B. clonal deletion.
C. clonal proliferation.
D. cytotoxicity.
ANSWER: C

51. Interferons _____.
A. activate B cells to make virus-specific antibodies.
B. are TH2 cytokines.
C. are virus proteins that interfere with activation of cytotoxic T cells.
D. block virus infection of host cells.
ANSWER: D

52. Cytokines are _____.
A. able to increase B-cell proliferation.
B. able to stimulate an increase in antibody production.
C. able to activate T-cells.
D. All the above.
ANSWER: D

53. A cell that contains proteins enabling a hormone to selectively bind to its plasma membrane is called a(n)
A. secretory cell.
B. plasma cell.
C. endocrine cell.
D. target cell.
ANSWER: D

54. The major purpose of lymphokines is to _____.
A. bind to class I major histocompatibility molecules for cytotoxic function
B. specifically recognize antigens or their fragments
C. stimulate the production of complement.
D. help control and regulate the cells of the immune system.
ANSWER: D

55. All the following are lymphokines EXCEPT _____.
A. interferon.
B. histamine.
C. tumor necrosis factor.
D. transforming growth factor.

ANSWER: B

56. Clonal selection implies that
A. brothers and sisters have similar immune responses.
B. antigens increase mitosis in specific lymphocytes.
C. only certain cells can produce interferon.
D. a B cell has multiple types of antigen receptors.
ANSWER: B

57. The major role of IL-4 is to promote the _____.
A. macrophage activation.
B. IgG responses.
C. IgE responses.
D. IgM responses.
ANSWER: C

58. Transforming growth factor-? _____.
A. activates macrophages.
B. activated fibroblasts.
C. enhances T-cell functions.
D. enhances B- cell function.
ANSWER: B

59. Which of the following cell types are responsible for initiating a secondary immune response?
A. memory cells.
B. macrophages.
C. stem cells.
D. B cells.
ANSWER: A

60. The major role of T- cells in the immune response includes _____.
A. complement Fixation
B. phagocytosis.
C. production of antibodies.
D. recognition of epitopes presented with major histocompatibility complex molecules on the surfaces.
ANSWER: D

61. Complement fixation _____.
A. can be modified by the cholera toxin.
B. has no intrinsic guanylate cyclase activity.
C. . can be desensitized by phosphorylation.
D. is an effector function of IgG and IgM following antigen binding
ANSWER: D

62. The MHC is important in a T cell's ability to _____
A. distinguish self from nonself.
B. recognize specific parasitic pathogens.
C. identify specific bacterial pathogens.
D. identify specific viruses.
ANSWER: A

63. Complement is involved in all of the following EXCEPT _____.
A. attraction of neutrophils to an infection site.
B. increased presence of serum proteins in the infected tissues.
C. lysis of bacteria in the absence of specific antibodies.
D. opsonization of microorganisms for phagocytosis
ANSWER: C

64. Complement is _____.
A. activated by binding to specific complement receptors.
B. antigen-specific.
C. present in the circulation in an inactive form.
D. a series of intracellular proteins which work with antibody to eliminate endogenous antigen.
ANSWER: C

65. The alternative pathway of complement activation _____.
A. causes tissue damage in the absence of C1INH.
B. occurs after the classic pathway is activated.
C. occurs only if the classical pathway is ineffective in pathogen clearance
D. requires C3.
ANSWER: D

66. In the membrane attack phase of the classical complement pathway, the role of C5b is to _____.
A. activate the C5 convertase activity.
B. attract neutrophils to lyse the pathogen.
C. initiate formation of the MAC.
D. polymerize into a membrane-spanning channel.
ANSWER: C

67. Activated TC can regulate immune responses by signaling activated lymphocytes to undergo _____.
A. apoptosis.
B. clonal deletion.
C. clonal proliferation.
D. cytotoxicity.
ANSWER: C

68. As complement is activated by complexes of antibody-coated bacteria, bystander lysis of nearby host cells is prevented by _____.
A. a long-lived thioester bond on active complement proteins.
B. covalent attachment of all active complement proteins to the pathogen surface.
C. plasma proteins that inactivate the anaphylatoxins
D. proteins on host cell membranes that inhibit MAC formation.
ANSWER: D

69. Killer T-cells affect their killing by _____.
A. antibodies with specific recognition capabilities.
B. inserting the complement components, CS and C9, into the target cell membrane.
C. the T- cell antigen receptor and Class MHC proteins.
D. inserting a pore forming protein called perforin into the target cell membrane.
ANSWER: D

70. The functional activity of the T-cell _____.
A. is dictated by the T4 or T8 associated polypeptides.
B. occurs after recognition of an epitope by a paratope.
C. can be mediated through cytokines.
D. requires only the alpha and beta chains of the T- cell receptor.
ANSWER: D

71. Target cell lysis and destruction can be achieved by _____.
A. cytotoxic T-cells recognizing specific epitopes on the target cell surface.
B. perforin released from antigen-specific cytotoxic T-cells.
C. complement binding to IgG and IgM type antibodies which have bound to epitopes on the target cell surface.
D. complement binding to IgE type antibodies which have bound to epitopes on the cell surface.
ANSWER: D

72. Which of the following is NOT true of the ability of the T-cell receptor (TCR) to specifically recognize antigen?
A. Only the alpha chain of the TCR is necessary for antigen.
B. The recognition of the antigen by the TCR can mediate helper, suppressor or cytotoxic function.
C. The recognition of antigen by the TCR can result in cytokine secretion and/or an increase in cell proliferation within the immune system.
D. The antigen is recognized by the T3-TCR complex only when it is associated with a protein of the major histocompatibility complex
ANSWER: A

73. The cytoplasm of NK cells contains _____.
A. fragments.
B. perforin.
C. organism.
D. dendrites.
ANSWER: B

74. Mast cell granules contain ____.
A. complement.
B. epinephrine.
C. histamine.
D. acetylcholine.
ANSWER: C

75. The IgE mediated degranulation of mast cells does NOT involve _____.
A. complement activation.
B. rise in intracellular calcium.
C. synthesis of leukotriene.
D. release of vasoactive agents from granules.
ANSWER: A

76. On degranulation the mast cells release which one of the following?
A. Anaphylatoxins.
B. Interleukin-1.
C. Interleukin-4.
D. Immunoglobulin E.
ANSWER: C

77. The Arthus reaction results from local _____.
A. red cell lysis.
B. mast cell degranulation.
C. cytokine release.
D. complement activation.
ANSWER: D

78. Immune complexes cause hypersensitivity by stimulating _____.
A. T-cells.
B. neutrophil invasion.
C. eosinophil invasion.
D. basophil immigration.
ANSWER: B

79. In which of the following situations will helper T cells be activated?
A. when an antigen is displayed by a dendritic cell.
B. when a cytotoxic T cell releases cytokines.
C. when natural killer (NK) cells come in contact with a tumor cell.
D. in the bone marrow during the self-tolerance test.

ANSWER: A

80. Allergic contact dermatitis can be diagnosed by _____.
A. patch test.
B. . complement fixation test.
C. provocation test.
D. intradermal skin test.
ANSWER: D

81. Transplanted cells are mainly destroyed by _____.
A. neutrophils.
B. macrophages.
C. B-cells.
D. T-cells.
ANSWER: D

82. The fetus can be considered as a/an _____.
A. isograft.
B. allograft.
C. heterograft.
D. xenograft.
ANSWER: B

83. _____ are involved in cell-mediated immunity and destroy virally infected cells.
A. cytotoxic T cells.
B. natural killer cells.
C. helper T cells.
D. macrophages.
ANSWER: A

84. One of the ways by which allograft rejection is prevented is through the administration of _____.
A. antibodies to CD3.
B. IgE.
C. anti-interferon antibodies.
D. anti-rhesus antibodies
ANSWER: A

85. Corticosteroids mainly suppress allograft rejection by suppressing _____.
A. macrophage function.
B. T-cell function.
C. antibodies synthesis.
D. neutrophil function.
ANSWER: B

86. The major targets of cytotoxic T-cells within a kidney allograft are _____.
A. neutrophils
B. proximal tubule cells
C. vascular endothelial cells.
D. macrophages.
ANSWER: C

87. The major clinical problem associated with bone marrow allografts in human is _____.
A. aplastic anemia.
B. allograft rejection.
C. contact dermatitis.
D. graft vs host disease.
ANSWER: D

88. One mechanism by which tumors evade immunological destruction is _____.
A. release of lymphotoxins
B. production of immunosuppressive molecules.
C. altered pathway cytotoxicity.
D. secretion of anticomplementary factors.
ANSWER: B

89. Carcinoembryonic antigen is characteristically secreted by tumors of the _____.
A. kidney.
B. lungs.
C. bones.
D. GI tract.
ANSWER: D

90. Macrophage anti-tumor activity is mainly mediated by _____.
A. TNF anf IL-1.
B. nitric oxide and IL-6.
C. nitric oxide and TNF.
D. IL-1 and IL-6.
ANSWER: C

91. Tumor enhancement is _____.
A. promotion of tumor growth by Ab.
B. promotion of tumor growth by drugs.
C. promotion of tumor growth by NK-cells.
D. inhibition of tumor growth by Ab
ANSWER: A

92. Which of the following is the last line of defense against an extracellular pathogen?
A. lysozyme production.
B. phagocytosis by neutrophils.
C. antibody production by plasma cells.
D. histamine release by basophils.
ANSWER: C

93. In combined immunodeficiency there is a loss of _____.
A. B- and T- cells.
B. T- and NK- cells.
C. neutophils and macrophages.
D. eosinophils and neutrophils
ANSWER: B

94. The failure to develop thymus and parathyroid is called _____.
A. combined immunodeficiency.
B. DiGeorge syndrome.
C. X-linked agammaglobulinemia.
D. Chediak-Higashi syndrome.
ANSWER: B

95. Which is considered the gold standard of existing vaccines?
A. Purified proteins.
B. Whole-organism.
C. DNA-based.
D. Inactivated exotoxin.
ANSWER: B

96. Autoimmune diseases result when the immune system_____.
A. fails to distinguish self from non-self.

B. over reacts to certain antigens.
C. is weakened by vaccines.
D. all of the above.
ANSWER: A

97. Which of the following is CORRECT with Xenograft?
A. Transplant from one region of a person to another region.
B. Transplant from one person to another person.
C. Transplant from one species to another species.
D. Transplant from one species to same species.
ANSWER: C

98. Which of the following statements describes an ideal tumor marker?
A. The ideal marker must have a low false-negative rate; that means that all patients with a particular type of cancer should test positive.
B. The circulating level of an ideal tumor marker should correlate directly with the amount of viable tumor and be a measure of the response to therapy.
C. The ideal tumor marker should act as a prognostic indicator.
D. All of the above.
ANSWER: D

99. Which cell type interacts with both the humoral and cell-mediated immune pathways?
A. helper T cells.
B. natural killer cells.
C. cytotoxic T cells.
D. plasma cells.
ANSWER: A

100. Which of the following involves allograft rejection?
A. Helper T cells.
B. B cells.
C. Cytotoxicity.
D. Cytokines.
ANSWER: B

101. AIDS _____.
A. reduces the number of T-cells.
B. is self infectious disease.
C. reduces the number of helper T-cells.
D. is the result of incapability of forming interferon.
ANSWER: C

102. Triple antigen (D.P.T) is for _____.
A. Tetanus, whooping cough, Pertusis and diphtheria.
B. Polio, rabies and hepatitis
C. Malaria, typhoid and cancer
D. Mixture of virus of tetanus, diphtheria and whooping cough.
ANSWER: A

103. All of the following are involved in immediate hypersensitivity EXCEPT_____.
A. mast cells.
B. histamine.
C. IgE.
D. platelets.
ANSWER: D

104. Hemolytic disease of the newborn due to RhD incompatibility depends upon the _____.
A. transplacental passage of anti-RhD IgG antibodies.

B. transplacental passage of anti-RhD IgM antibodies
C. production of cytoxic antibodies by the baby.
D. production of cytoxic antibodies by the mother
ANSWER: B

105. The fragment that does not belong to the anaphylatoxin is _____.
A. C3a.
B. C3b.
C. C4a.
D. C5a.
ANSWER: B

106. Antibody-dependent cell-mediated cytotoxicity (ADCC) is a process in which antibody-coated cells are killed by _____.
A. the antibodies.
B. complement.
C. cytotoxic T cells.
D. cells with Fc receptors for IgG3
ANSWER: D

107. What are CD4 and CD8?
A. proteins secreted by antigen-presenting cells.
B. receptors present on the surface of natural killer (NK) cells.
C. T-independent antigens.
D. molecules present on the surface of T cells where they enhance cellular interaction.
ANSWER: D

108. Which tumor is commonly observed in AIDS patients?
A. melanoma.
B. carcinoma.
C. Kaposi's syndrome.
D. Burkitt's lymphoma.
ANSWER: C

109. The drug that is used to treat AIDS patients is _____.
A. azidothymidine.
B. tetracycline.
C. cortisone.
D. cyclosporine.
ANSWER: A

110. It is difficult to produce a vaccine against AIDS because the HIV virus _____.
A. is drug resistance
B. has a reverse transcriptase.
C. shows antigenic variation.
D. hides within the cell
ANSWER: C

111. The major disadvantage with the active immunization is that it _____.
A. causes prolonged immunity
B. induces rapid onset of immunity.
C. induces slow onset of immunity.
D. is expensive.
ANSWER: C

112. The organism suitable for use in recombinant vaccines is _____.
A. influenza virus.
B. poliovirus.

C. smallpox.
D. vaccinia virus.
ANSWER: D

113. Why can normal immune responses be described as polyclonal?
A. Blood contains many different antibodies to many different antigens.
B. Construction of a hybridoma requires multiple types of cells.
C. Multiple immunoglobulins are produced from descendants of a single B cell.
D. Diverse antibodies are produced for different epitopes of a specific antigen.
ANSWER: D

114. All of the following are true with regard to IgE EXCEPT _____.
A. an allergy associated immunoglobulin.
B. the least abundant immunoglobulin in the plasma.
C. binds to mast cells.
D. can cross the placental barrier.
ANSWER: D

115. How do antibodies of the different classes IgM, IgG, IgA, IgD, and IgE differ from each other ?
A. in the way they are produced.
B. in their heavy chain structure.
C. in the type of cell that produces them.
D. by the antigenic determinants that they recognize.
ANSWER: B

116. The immunoglobulin Joining chain (J-chain) is _____.
A. only produced by T-Cells.
B. . only produced by neutrophils.
C. associated with only multimeric forms of lgM and IgA.
D. associated with IgE for histamine release
ANSWER: C

117. Class switching of immunoglobulins occurs _____.
A. usually with booster immunizations, going from IgM to IgG.
B. binds complement.
C. causes the histamine release.
D. mediates immunoglobulin class switching.
ANSWER: A

118. When a B-cell undergoes immunoglobulin class switching the variable region of the _____.
A. light chain changes, but its constant region remains the same
B. light chain remains the same, but its constant region changes.
C. heavy chain remains the same but its constant region changes.
D. heavy chain changes but its constant region remains the same
ANSWER: C

119. The classical pathway of complement activation _____.
A. starts with the activation of the C3 component.
B. is activated by lipopolysaccharide cell wall constituents.
C. is activated by IgA immune complexes.
D. is activated by IgM immune complexes
ANSWER: D

120. Which of the following cells are cytotoxic?
A. CD4 T cells.
B. CD8 T cells.
C. B cells.
D. T helper 1 cells.

ANSWER: B

121. Organ culture refers to culture of _____.
A. disaggregated tissue.
B. undisaggregated tissue.
C. different cell type.
D. trypsinized cells.
ANSWER: B

122. The culture media containing amino acids is sterilized by _____.
A. dry heat.
B. moist heat
C. filter sterilization
D. autoclave.
ANSWER: C

123. The material used to make the filters include _____.
A. nylon.
B. cellulose nitrate.
C. polyethylene.
D. cellulose sulphate.
ANSWER: A

124. The cell culture technique is used to study the _____.
A. intracellular activity.
B. cell-cell interaction.
C. intracellular flux
D. all the above.
ANSWER: D

125. Which cell line is used in the production of vaccine?
A. Chick embryo fibroblast.
B. HeLa cell line
C. Vero cell line.
D. HEK cell line.
ANSWER: A

126. Which of the following can be used as culture media?
A. Lymph.
B. Balanced salt solution
C. RPMI.
D. All the above.
ANSWER: D

127. Balanced Salt Solution provides _____.
A. essential inorganic ions.
B. pH.
C. glucose.
D. All the above.
ANSWER: D

128. The salts in the media help to _____.
A. maintain osmolality
B. maintain charge
C. regulate membrane potential.
D. all the above.
ANSWER: D

129. The cultured cells are characterized by the _____.
A. low cell-cell interaction
B. absence of 3-D architecture of the in vivo cell.
C. proliferation and spreading of unspecialized cells.
D. all the above.
ANSWER: D

130. Cell synchronization refers to bring the cells at different stages of the cell cycle in a cultured to bring the _____.
A. same phase of cell cycle.
B. mitosis phase.
C. synthesis phase.
D. cytokinesis phase.
ANSWER: A

131. Which of the following criteria are used for cell separation?
A. Cell size.
B. Cell specificity.
C. Affinity of antigen.
D. Cell pores.
ANSWER: A

132. Elimination of serum from the culture media for about 24hour in the cells accumulates at _____.
A. G0 phase.
B. G1 phase.
C. G2 phase.
D. S phase.
ANSWER: B

133. The nutritional deprivation cannot be used to synchronize _____.
A. transformed cells
B. primary cultured cells
C. passaged cells.
D. finite cell lines
ANSWER: A

134. Apoptosis or programmed cell death occur due to _____.
A. internal signals.
B. external signals.
C. reactive oxygen species.
D. all the above.
ANSWER: D

135. The major enzyme involved in the process of apoptosis is _____.
A. caspase.
B. endonuclease.
C. exonuclease.
D. restriction enzyme
ANSWER: A

136. Apoptosis can be measured by _____.
A. determining ADP/ATP ratio.
B. TUNEL assay.
C. DNA laddering assay.
D. all the above.
ANSWER: D

137. Disaggregating of cells can be achieved by

A. physical disruption.
B. enzymatic digestion.
C. treating with chelating agents.
D. all of the above.
ANSWER: D

138. Which of the following is incorrect?
A. Established cell lines (ECL) have short doubling time.
B. ECL are invariably aneuploid.
C. ECL grow in higher density.
D. ECL do not show much evidence of spatial orientation.
ANSWER: C

139. The mechanical disaggregation of the tissue involves _____.
A. breaking.
B. sucking.
C. pipetting.
D. mixing.
ANSWER: C

140. The finite cell lines normally undergo _____ doubling
A. 20-100.
B. 75-150.
C. 100-175.
D. 200-250.
ANSWER: A

141. Continuous cell lines are _____.
A. transformed.
B. mortal.
C. transgenic.
D. doubling.
ANSWER: A

142. The cell culture can be maintained by checking the _____.
A. cell concentration.
B. increase in pH.
C. temperature.
D. Environmental condition
ANSWER: A

143. The suspension culture is used to propagate the cells which are _____.
A. adhesive.
B. non-adhesive.
C. different in morphology.
D. semi-adhesive.
ANSWER: B

144. The advantage of suspension cell culture is to _____.
A. get heterogeneous suspension of cells.
B. complication of scale up procedure.
C. make process of propagation is faster
D. make process of propagation is slow.
ANSWER: C

145. The criteria for suspension subculture of cells is _____.
A. culture intesity.
B. temperature change representing medium exhaustion.

C. schedule timings of subculture
D. culture morphology.
ANSWER: C

146. The enzyme trypsin is active at _____degree celcius.
A. 45.
B. 37.
C. 25.
D. 40.
ANSWER: B

147. The feeder layers are _____.
A. growth arrested confluent monolayer.
B. layer of dead cells.
C. actively proliferating cells.
D. cells that are about to die.
ANSWER: A

148. What is the effect of excess accumulation of metabolite products (lactate and ammonium) on cells?
A. They act as growth promoters.
B. They act as growth inhibitors.
C. Have no effect on cells.
D. Lactate helps in the growth while ammonium inhibits the growth.
ANSWER: D

149. Some cells do not clone (propagate) well due to the ability to survive at _____.
A. low cell density.
B. high cell density
C. increased cell size
D. decreased cell size
ANSWER: A

150. The lipid present in serum is/are _____.
A. linolenic acid.
B. oleic acid.
C. serine.
D. stearic.
ANSWER: B

151. The disadvantage of serum in cell culture is/are _____.
A. physiological variability.
B. shelf life and consistency.
C. specificity.
D. all the above.
ANSWER: D

152. The viability of the cells can be checked using _____.
A. dye exclusion assay.
B. clonogeneic assay.
C. cytotoxicity assay.
D. microtitration assay.
ANSWER: A

153. What are the main constituents of culture for animal cell growth?
A. Glucose and Glutamine.
B. Growth factors.
C. Cytokines.
D. All of these.

ANSWER: A

154. The viability of the cells is based on membrane_____.
A. integrity.
B. permeability.
C. thickness.
D. composition.
ANSWER: A

155. The contaminants in the tissue culture is/are _____.
A. bacteria.
B. fungi.
C. mold.
D. all the above.
ANSWER: D

156. 5% CO2 is required to maintain the _____.
A. pH of the medium.
B. osmolality.
C. salt concentration.
D. humidity.
ANSWER: A

157. The optimal temperature for cell culture is dependent on _____.
A. pH.
B. temperature.
C. the incorporation of a safety factor to allow for minor errors in regulating the incubator.
D. humidity.
ANSWER: C

158. Choose the correct pair.
A. salt- osmolality.
B. growth factor-cell proliferation.
C. glucose- energy.
D. all the above.
ANSWER: D

159. The contact inhibition is the characteristic of _____.
A. primary cell line.
B. transformed cell line.
C. continuous cell line.
D. cancerous cell line.
ANSWER: A

160. The enzyme trypsin is used in animal tissue culture to _____.
A. facilitate the cells to adhere to the culture dish.
B. detach the from the culture dish.
C. enhance the growth of the cultures cells.
D. digest the dead cells.
ANSWER: B

161. The human fibroplast is a classical example of _____
A. stable primary cell lines.
B. established cell lines.
C. cell transformations.
D. none of these.
ANSWER: A

162. The transgene are introduced into an animal using a/an _____.
A. retroviral vector.
B. bacteria.
C. fungi.
D. algae.
ANSWER: A

163. The retroviral vector can effectively carry the genes up to _____ kb.
A. 12.
B. 8.
C. 20.
D. 35.
ANSWER: B

164. Embryonic stem cells are collected from _____.
A. inner cell mass.
B. trophoblast.
C. blastocoels.
D. gastrocoel.
ANSWER: A

165. pH of culture medium is initially controlled by
A. presence of CO2.
B. presence of bicarbonate buffer.
C. addition of bases.
D. none of these.
ANSWER: B

166. The marker commonly used for the selection of the transgene is _____.
A. oxidase.
B. neomycin phosphotransferase.
C. hydroxylase.
D. phosphatase.
ANSWER: B

167. The process in which the existing function of a gene can be blocked by destroying the gene is called _____.
A. transgenesis.
B. transgenesis.
C. gene knockin technology.
D. miRNA technology.
ANSWER: B

168. Knockout mice are an important animal model to _____.
A. study the function of a particular gene.
B. study the function of a particular gene.
C. mimic a diseased state.
D. study the signal transduction.
ANSWER: B

169. The first knockout mouse was created by _____.
A. Mario& Evans.
B. Standbury & Stevenson.
C. Standbury & Stevenson.
D. Kohler & Milstein.
ANSWER: A

170. Jenner observed that milkmaids who were infected with cowpox were later immune to smallpox

infections. This is an example of _____.
A. acquired immunity of barrier skin cells.
B. active immunization with a non-related organism that causes similar symptoms.
C. memory response to a cross-reactive antigen.
D. passive immunization from contact with cow's milk antibodies.
ANSWER: A

171. Who demonstrated the cell mediated immunity?
A. Elie Metchnikoff.
B. Elvin Kabat.
C. Von Behring.
D. Louis Pasteur.
ANSWER: A

172. The immune response to a booster vaccine is called a _____.
A. secondary response.
B. humoral response.
C. innate response.
D. primary response.
ANSWER: A

173. Who demonstrated the mechanism of immunity for which the Nobel Prize was awarded?
A. Edward Jenner.
B. Emil Von Behring.
C. Robert Koch.
D. Alexander Flemming.
ANSWER: B

174. Which one of the following is NOT a part of the innate immune system?
A. Mast cells.
B. Complement.
C. Phagocytes.
D. T cells.
ANSWER: C

175. Which one of the following statements is correct regarding the innate immune system?
A. It is specific.
B. It evokes a more potent response on secondary exposure.
C. It represents the first line of defense.
D. It is able to memorise pathogens on subsequent exposures.
ANSWER: C

176. Which one of the following are the features of adaptive (acquired) immune response?
A. Acute inflammation.
B. Self-/non-self discrimination.
C. Natural killer (NK) cells.
D. Surface epithelia.
ANSWER: C

177. Which of the following is present right from birth?
A. Adaptive immunity.
B. Innate immunity.
C. Specific immunity.
D. Acquired immunity.
ANSWER: B

178. Mechanical barriers in the innate immune system's first line of defense include _____.
A. continuous barrier formed by skin and mucous membranes.

B. sebum (pathogen-inhibiting agents).
C. mucus (pathogens stick and are swept away).
D. enzymes (hydrolyse pathogens).
ANSWER: A

179. Chemical barriers in the innate immune system's first line of defense include _____.
A. sebum (pathogen-inhibiting agents).
B. mucus (pathogens stick and are swept away).
C. HCl in gastric mucosa to destroy pathogens; saliva, perspiration, tears, urine.
D. all of the above.
ANSWER: D

180. Opsonin is a _____.
A. granulocyte.
B. chemokine.
C. lysosomal enzyme.
D. substance that enhances phagocytosis.
ANSWER: D

181. Which of the following is directly responsible for the humoral immunity?
A. Dendritic cells.
B. B cells.
C. Macrophages.
D. Dendritic cells.
ANSWER: D

182. Toll like receptor is involved in _____.
A. innate immunity.
B. acquired immunity.
C. adaptive immunity.
D. specific immunity.
ANSWER: A

183. In enzyme-linked immunosorbent assay _____.
A. antibody or antigen is bound to an enzyme, which catalyzes the reaction.
B. substrates in the reaction is converted to a colored end-product.
C. antigen or antibody can be detected quantitatively with extremely sensitivity.
D. all the above.
ANSWER: D

184. The most sensitive immunological test in terms of the amount of antibody detectable is _____.
A. agglutination test.
B. complement fixation test.
C. gel precipitation test.
D. agglutination test.
ANSWER: B

185. Which of the following are fluorochromes?
A. Fluorescein.
B. Phycoerythrin.
C. Rhodamine.
D. All the above.
ANSWER: D

186. Gene targeting is done on a _____.
A. sperm cell.
B. egg cell.
C. fertilized ovum.

D. early embryonic cell.
ANSWER: D

187. DNA microarrays are used for _____.
A. DNA variation screening.
B. gene expression profiling.
C. microarray comparative genomic hybridization.
D. All of the above.
ANSWER: D

188. A microarray commonly contains _____ nucleotides.
A. 1 to 5.
B. 5 to 15.
C. 15to25.
D. 25to100.
ANSWER: C

189. The proper joining of one VL to one JL is regulated by _____.
A. heptamer and nonamer sequences.
B. leader sequences.
C. P-nucleotide addition sites
D. 12 and 23 nucleotide spacers between heptamer and nonamer sequences.
ANSWER: D

190. The DNA microarrays technology that indicates which genes are transcribed is called ____.
A. DNA variation screening.
B. gene expression profiling.
C. microarray comparative genomic hybridization.
D. antisense.
ANSWER: B

191. Swapping an inactivated allele for a gene of interest produces a _____ mouse.
A. knockout.
B. gene targeted.
C. knockin.
D. transgenic.
ANSWER: A

192. The first patent for a transgenic organism was awarded in 1988. Which organism was patented?
A. a yeast used in industrial processes.
B. a bacterium able to metabolize components of crude oil.
C. a mouse that manufactures human protein in its milk.
D. Life forms cannot be patented.
ANSWER: C

193. Which gene transfer technique involves a tiny needle which is used to inject DNA into a cell lacking that DNA sequence?
A. Electroporation.
B. Microinjection.
C. Liposome transfer. .
D. Particle bombardment.
ANSWER: A

194. The DNA microarrays technology that tracks deletions and amplifications of specific DNA sequences is called _____.
A. DNA variation screening.
B. gene expression profiling.
C. microarray comparative genomic hybridization.

D. antisense.
ANSWER: C

195. A microarray is a _____.
A. ray of a small wavelength.
B. a type of ultraviolet ray.
C. an RNA probe used to identify viruses.
D. an arrangement of oligonucleotide probes, closely arranged on a small solid support surface.
ANSWER: D

196. Which one of the following is the quickest method for measuring serum immunoglobulin levels accurately?
A. Immunoelectrophoresis.
B. Nephelometry.
C. Radioimmunoassay.
D. Radial immunodiffusion.
ANSWER: B

197. Primary mRNA for H chain encodes _____.
A. one VH, one DH, and one JH segment.
B. one VH, one DH, and multiple JH segments.
C. multiple VH, one DH, and one JH segments.
D. multiple VH, one DH, and multiple JH segments.
ANSWER: A

198. The molecules in the Ig superfamily share _____.
A. antigen binding sites.
B. domains.
C. variable region.
D. tyrosine residues.
ANSWER: B

199. Immunoglobins _____.
A. are antibodies.
B. are classified as paratope and epitope.
C. have a molecular specificity to recognize unique paratope.
D. have low density.
ANSWER: A

200. In type I hypersensitivity, which of the following DOES NOT happen upon second exposure to the antigen?
A. IgE binds to Fc receptors of mast cells.
B. Degranulation of sensitized mast cells.
C. Histamine release.
D. Smooth muscle contraction
ANSWER: A

201. In the spleen, T- lymphocytes are mainly found in _____.
A. follicular areas.
B. periarteriolar lymph sheath.
C. red pulp.
D. marginal zone.
ANSWER: B

202. Opsonin is a _____.
A. granulocyte.
B. chemokine.
C. lysosomal enzyme.

D. substances that enhances phagocytosis
ANSWER: D

203. A hapten is a _____.
A. small molecule attached to a protein.
B. antibiotic.
C. antibiotic.
D. carbohydrate side chain.
ANSWER: A

204. The antigen combining site of an antibody molecule determines its _____.
A. isotype.
B. allotype.
C. idiotype.
D. anti-idiotype
ANSWER: C

205. Molecules in the immunoglobulin superfamily share _____. .
A. antigen binding sites.
B. domains.
C. variable regions.
D. tyrosine residues
ANSWER: C

206. The strength of binding between an antigen and its antibody is called as _____.
A. affinity.
B. avidity.
C. valency.
D. hydrophobicity.
ANSWER: A

207. The first immunoglobulin that is produced after an infection is _____.
A. IgG.
B. IgM.
C. IgE.
D. IgA.
ANSWER: B

208. The CDR region of immunoglobulin
A. activate complement.
B. bind to antigen.
C. bind to cells.
D. mediate opsonization.
ANSWER: B

209. Which of the following is the most sensitive immunological test?
A. Complement fixation test.
B. Radio immunoassay.
C. Immunoelectrophoresis.
D. Precipitation reaction.
ANSWER: B

210. Which one of the following cell produces antibody?
A. B.
B. T.
C. Macrophages.
D. NK.
ANSWER: B

211. A hapten is a (n) _____.
A. small molecule attached to a protein.
B. antibiotic.
C. antibiotic.
D. carbohydrate side chain.
ANSWER: D

212. A protein is poorly expressed in a diseased tissue. To determine whether the defect is at the level of transcription or translation, which of the following blotting methods would you use?
A. Southern.
B. Southern and northern.
C. Northern and western.
D. Western.
ANSWER: C

213. Super antigen activates _____.
A. T- cells in an Ag non- specific manner by cross linking TCR with the MHC Class II molecules.
B. B- cells in an Ag non- specific manner by cross linking BCR with the MHC Class II molecules.
C. both T and B- cells without binding to TCR or BCR.
D. T- cells in an Ag specific manner.
ANSWER: A

214. The major role of T- cells in the immune response includes _____.
A. complement fixation.
B. phagocytosis.
C. production of antibodies.
D. recognition of epitopes presented with major histocompatibility complex molecules on the surfaces.
ANSWER: D

215. Which immunoglobulin mediates immediate hypersensitivity and is involved in immune responses to parasitic infections?
A. IgM.
B. IgM.
C. IgA.
D. IgE.
ANSWER: D

216. Which of the following is present in TH cells?
A. CD4+.
B. CD8+.
C. CD5+.
D. CD6+.
ANSWER: A

217. The domain unit of an immunoglobulin or T-cell antigen receptor _____.
A. only recognizes the paratope.
B. only recognizes the paratope.
C. only fixes complement.
D. is typically about 110 amino acids long.
ANSWER: D

218. Effector functions of immunoglobulins are the property of the constant region domains of _____.
A. L-chains.
B. J-chains.
C. H-chains.
D. F-chains.
ANSWER: C

219. The two type of light chains of antibodies are _____.
A. able to associate specifically with T4 orT8 proteins.
B. normally not glycosylated.
C. the basis of the five major classes of antibodies.
D. distinguished by their constant region domains.
ANSWER: D

220. The T-cell receptor _____.
A. is composed of four polypeptide chains.
B. is secreted into the plasma by the T-cell.
C. is the recognition element of the humoral arm of the immune system.
D. recognizes antigen fragments via the alpha and beta chains.
ANSWER: D

221. Killer T-cells effect their killing by _____.
A. antibodies with specific recognition capabilities.
B. inserting the complement components, CS and C9, into the target cell membrane.
C. inserting a pore forming protein called perforin into the target cell membrane.
D. the T- cell antigen receptor and Class MHC proteins.
ANSWER: C

222. The major purpose of lymphokines is to _____.
A. help control and regulate the cells of the Immune system.
B. bind to class I major histocompatibility molecules for cytotoxic function.
C. specifically recognize antigens or their fragments
D. stimulate the production of complement.
ANSWER: A

223. Which one of the following adhesion molecule deficiencies leads to marked neutrophil leucocytosis?
A. CD49d-CD29 (VLA-4).
B. CD18-CD11.
C. CD62L (L-selectin).
D. VCAM-1.
ANSWER: B

224. Allergies result from the production of _____ directed against an antigen.
A. IgG.
B. IgA.
C. IgM.
D. IgE.
ANSWER: D

225. A person does not normally produce antibodies or activated T cells to self antigen due to the presence of _____.
A. haptens.
B. immunoglobulins.
C. human leucocyte antigen.
D. non-self antigen.
ANSWER: C

226. The B-lymphocyte antigen receptor is _____.
A. Ig M.
B. Ig G.
C. Ig A.
D. Ig D.
ANSWER: A

227. _____ is capable of penetrating the antigen sensitive T cells and selectively blocking the transcription of lymphokine mRNA.
A. Azathioprine.
B. Methotrexate.
C. Cyclophosphamide.
D. Cyclosporin A.
ANSWER: D

228. When IgE on mast cell FceR is cross-linked by, antigen, the mast cell responds by _____. .
A. apoptosis.
B. presenting the antigen to Th cells.
C. secreting IgE.
D. secreting histamine and other allergic mediators
ANSWER: D

229. Amino acid sequences in lymphocyte signal transduction complexes which are phosphorylated following antigen binding are called _____.
A. ITAMs.
B. ITIMs.
C. MAPs.
D. PTKs.
ANSWER: A

230. DAG and IP3 are released from PIP2 by the action of _____.
A. adaptor protein.
B. phospholipase C (PLC).
C. protein kinase C (PKC).
D. small G protein.
ANSWER: B

231. Haemolytic disease of newborn infants can be prevented by _____.
A. exchange transfusion.
B. administration of allergen.
C. antihistamines.
D. administration of anti-Rh antibodies.
ANSWER: B

232. The antigen-binding region of TCR is formed by the folding of _____.
A. Va and Vb chains.
B. Va, Vb, and CD3 chains.
C. Va and Vb2-microglobulin chains.
D. Vg and Va chains.
ANSWER: A

233. Allotypic determinants are _____.
A. a. constant region determinants that distinguish each Ig class and subclass within a species.
B. expressed only from the paternal chromosome.
C. generated by the conformation of antigen-specific VH and VL sequences.
D. Not immunogenic in individuals who do not have that allotype.
ANSWER: A

234. If a person is born without C2 and C4, then _____.
A. C5 can still be cleaved by the classical pathway.
B. C3b will not be able to bind to bacteria.
C. C9 will polymerize inappropriately and lyse host cells.
D. the classical pathway will be changed into the alternative pathway.
ANSWER: D

235. The Arthus reaction results from local _____.
A. red cell lysis.
B. mast cell degranulation.
C. cytokine release.
D. complement activation.
ANSWER: D

236. CHO stands for _____.
A. Chick Hamster Ovary.
B. Chinese Hamster Ovary.
C. Chinese Hamster Ovum.
D. Chinese Hen Ovary.
ANSWER: B

237. Serum is made up of _____.
A. hormones.
B. proteins.
C. fats.
D. amino acids.
ANSWER: A

238. Animal cells can be grown in _____.
A. glass petriplate.
B. plastic container.
C. culture dishes.
D. all of the above.
ANSWER: D

239. Cells derived from parental tissue for primary culture by _____.
A. physical method.
B. trypsin treatment.
C. addition of some substance.
D. chemical method.
ANSWER: B

240. Drawback of primary culture is _____.
A. cost.
B. need live tissues.
C. not easily available.
D. need more people.
ANSWER: B

241. Secondary cells can be removed by _____.
A. suction.
B. pipetting.
C. chemical substance.
D. none of the above.
ANSWER: B

242. Most media use _____ as its major components.
A. CO2 + H2O.
B. bicarbonate+ H2O.
C. CO2 + bicarbonate.
D. bicarbonate + H2O.
ANSWER: C

243. Acidic conditions turn phenol red into _____.
A. pink

B. red.
C. yellow.
D. white.
ANSWER: C

244. _____cannot divides in culture.
A. Fibroblasts.
B. Neuronal cells.
C. Epithelial cells.
D. Melanocytes.
ANSWER: B

245. The overgrowth of the cells in tissue culture is prevented by _____.
A. monoclonal antigen.
B. culture.
C. contact inhibition.
D. trypsin.
ANSWER: C

246. Doubling time of finite cell lines is _____ hours.
A. 12-24.
B. 24- 48.
C. 24- 72.
D. 24-96.
ANSWER: D

247. Major contributor to the osmolarity of the medium is _____.
A. sodium.
B. amino acid.
C. gluconic acid.
D. glyceraldehyde.
ANSWER: B

248. An animal that has gained new genetic information from the acquisition of foreign DNA is a _____.
A. transformed animal
B. transgenic animal.
C. vector.
D. transformed animal
ANSWER: B

249. Which of the following method is used to introduce a foreign gene?
A. Retroviral vector method.
B. ELISA method.
C. Western blot.
D. Spectroscopy method.
ANSWER: D

250. Embryonic stem cells are collected at _____.
A. gastrula stage.
B. gastrula stage.
C. both a and b.
D. blastocyte stage.
ANSWER: B

Staff Name
Srilatha S .