Immunological Exercises

Short Notes

1. Smallpox and Edward Jenner
2. Humoral Immunity and Cellular Immunity
3. Acquired Immunity
4. 2019-nCoV/SARS-CoV-2, COVID-19
5. Programmed cell death (apoptosis)
6. GALT (Gut-associated lymphoid tissue)
7. MIS (Mucosal lymphoid system)
8. APCs (antigen presenting cells)
9. Epitopes or antigenic determinants
10. T cell and B cell Epitopes
11. Common Ag and Cross Reaction
12. Heterophilic Ag and Autoantigen
13. Hapten
14.TD-Ag and TI-Ag
15. Heterophilic Ag and Autoantigen
16. Immunoglobulin (Ig) and Antibody (Ab)
17. Ig Isotype and Ig Allotype
18. Ig idotype
19. Monoclonal Ab and Polyclonal Ab
20. Neutralization
21. Opsonization
22. CDRs and VH
23. Fab and Fc
24. Noncovalent forces
25. Ig subtypes and sIgA
26. PAMPs/DAMPs (pathogen/danger/damage-associated molecular patterns)
27. PRRs (Pattern-recognition receptors)
28. NKG2D, MIC, KIR KLR
29. TLRs (Toll-like receptors)
30. Regulatory T cells (Tregs), Tr1, Th3
31. Immunoregulation
32. Central T Cell Tolerance
33. Peripheral tolerance
34. Positive selection and Negative selection
35. Immune tolerance and Dizygotic twin cows
36. CD28 and B7 molecules
37. Activation-induced cell death (AICD)
38. NK cells and γδT cells
39. DCs and macrophages (Mϕs)
40. TCR-CD3 complex

41. Mature B cells
42. Recombination signal sequence (RSS)
43. MHC restriction
44. GM-CSF and INF-γ
45. Cytokine storm/cytokine release syndrome (CRS)
46. Affinity maturation
47. ITIM (immunoreceptor tyrosine-based inhibitory motif) and ITAM
48. BCR (B cell receptor) and TCR (T cell receptor)
49. CDRs, complementary-determining regions
50. Monoclonal antibody(mAb)
51. Membrane attacking complex (MAC)
52. HLA and MHC
53. Cluster of differentiation (CD)
54. Anchor residues
55. ADCC (Antibody-dependent cell-mediated cytotoxicity)
56. TNF and IL-2
57. Immunologic Synapse
58. Fas /FasL
59. PD-1 (programmed cell death-1)/PD-L1
60. CTLA4(cytotoxic T-lymphocyte antigen4)/B7-1
61. CAR-T (chimeric antigen receptor T cells)
62. Graves disease and Myasthenia Gravis
63. Goodpasture's syndrome
64. Immune complex disease (ICD)
65. Arthus reaction
66. Serum sickness
67. Contact hypersensitivity
68. Asthma and Degranulation
69. Immunodeficiency disease (IDD)
70. Congenital immunodeficiency disease (CIDD)
71. X-linked Agammaglobulinemia (Bruton's Agammaglobulinemia)
72. DiGeorge syndrome
73. Severe Combined Immunodeficiencies SCID)
74. Human immunodeficiency virus (HIV)
75. System lupus erythematosus (SLE)
76. Rheumatoid arthritis (RA)
77. Multiple sclerosis (MS)
78. Insuline-dependent diabetes mellitus (IDDM)
79. Role of eosinophils in parasitic infection.
80. Immunity against intracellular bacteria.
81. Mucosal immunity against viral infections.
82. Mucosal immunity against bacterial infections.
83. T cell-mediated immune response against fungal infections.
84. TAA (tumor associated Ag) and TSA(tumor specificity Ag)

85. CSCs/TSCs (cancer stem cells)
86. Tumor immunological escape
87. Cancer immunotherapy
88. Immune checkpoint blockade
89. DC vaccine and subunit vaccine
90. Allograft and Xenograft
91. Direct recognition and Indirect recognition
92. Graft-versus-host disease (GVHD) and Host-versus-graft reaction (HVGR)
93. Mixed Lymphocytic Rejection (MLR)
94. Acute Reaction and Chronic Rejection
95. Artificial active immunity and Passive immunity
96. Antitoxin, toxoid, and immune serum
97. Flow Cytometry (FCM) and Immunofluorescence technique
98. ELISA (enzyme linked immunosorbent assay) and ELISPOT
99. Immunotherapy
100. Planed immunization

Essay Questions:

1.What is the role of the immune system?
2.What happens when the immune system doesn't work properly?
3. What is the innate immunity?
4.What is the adaptive immunity?
5.Comparison of Innate Versus Adaptive Immunity
6.What is the peripheral lympoid organs? Concise answer their major function please.
7.What is the Lymphocyte Traffic? and concise answer their major function please.
8.What is the Burnet's clonal selection theory?
9.What is the Immunological Tolerance?
10. What is the challenges of the immune system?
11. Please summarize the specificity of antigen (Ag).
12. Comparison of TD-Ag Versus TI-Ag, please!
13. How to understand the sequestered Ag and the super Ag?
14. How to understand the antigenic specificity?
15. Please demonstrate the basic structure of immunoglobulin.
16. What are the functions of antibodies?
17. What are the differences of primary and secondary response of antibody production?
18. How to understand the passive Ab therapy? (hint: COVID-19 therapy)
19. How to understand the relationship between innate and adaptive immune responses?
20. Please explain the functions of Mϕ (Macrophage) within 4h after infection!

21. How to understand the MHC and disease susceptibility?
22. Please description of the functions of NK cells, γδ T cells and NKT cells!
23. Please describe the biological activities of Igs.
24. Please describe what are the C3 convertases for the three kinds of activating complement pathways?
25. Please describe what are the C5 convertases for the three kinds of activating complement pathways?
26. Immune Organs and their main functions
27. Cells of Innate Immunity
28. Mononuclear phagocytes and their main functions
29. How do NK cells recognize and kill the sensitive target cells?
30. Please summarize the major surface molecules of T lymphocytes.
31. Please summarize the major surface proteins molecules of B lymphocytes.
32. Please summarize the major subsets and their functions of T lymphocytes.
33. Please summarize the major subsets and their functions of B lymphocytes.
34. Which components involve in innate immune response?
35. What are the double signals for T cells activation?
36. What are the differences of primary and secondary response for antibody production?
37. Please describe the exogenous pathway for antigen presentation.
38. Please describe the Active and suppressing receptors on the surface of T cells, B cells and NK cells.
39. Please describe the process of B cell-mediated immune response.
40. What are the primary and the secondary signal of T cell activation?
41. How do activated B cells undergo 'affinity maturation'?
42. What are the three phages of immune response?
43. What are the function of primary immune organs ?
44. What are the differences between the immune tolerance and the immunodeficiency, and immune inhibition?
45 What are the differences between the nTregs and iTregs?
46. How to understand the significance of regulation in clinic?
47. What is mainly mechanism in IgG antibody-mediated cytotoxic hypersensitivity ?
48. What is mainly mechanism in immune complex-mediated hypersensitivity ?
49. What is mainly mechanism in cell-mediated hypersensitivity ?
50. What is mainly mechanism in IgE antibody-mediated hypersensitivity ?
51. How to understand the autoimmunity? Discuss the postulation that could explain autoimmune responses, please!
52. What is autoimmune disease? Discuss the orgain-specific autoimmune disease, please !
53. Discuss the pathogenesis and immune response of HIV infection (AIDS), please!
54. Discuss the mechanism of $CD4^+$T cell depletion and dysfunction HIV infection, please !
55. How does the innate immune response "sense" bacteria?

56. Discuss briefly the humoral and cell mediated immune responses to viruses, for example, 2019-nCoV/SARS-Cov-2 infection, please!

57. How viruses evade the host defense mechanisms?

58. Discuss the host immune responses to bacterial infections, please!

59. How to understand the general overview of mucosal immunity to intestinal pathogens and commensal micro-organisms?

60. How to understand the *Mycobacterium tuberculosis* infection and granuloma formation?

61. In what ways do tumor cells different antigenically from normal cells? Please explain how tumor cells may be destroyed by the immune system!

62. If tumor cells can be destroyed by the immune system, how does cancer develop? What does immune cells and molecules involve?

63. How to understand the clone selection theory?

64. What are the differences between the immune tolerance and the immunodeficiency/immune inhibition?

65. How to understand the significance of immune tolerance in clinic?

66. Classify grafts and explain the graft-versus-host reaction, please!

67. Discuss potential mechanisms for and differences between hyperacute, acute, and chronic rejection.

68. How do present an antigenic peptides in the endocytic processing pathway?

69. How to understand the NK cells play an important role in "backing up" CD8 T cells?

70. How to understand the Mϕ activity can be further enhanced?