

1. Subacute Sclerosing Panencephalitis (SSPE) is a potential sequela of which virus?
 - A. Measles
 - B. Mumps
 - C. Respiratory syncytial virus
 - D. Rabies
 - E. EEE

2. Which virus is enveloped?
 - A. A virus that that is the #1 worldwide cause of diarrhea in children
 - B. A DNA virus used as a therapeutic vector to cure SCID
 - C. Hepatitis A
 - D. Hepatitis B

3. Which step of virus infection does neutralizing antibody block most effectively?
 - A. Encounter
 - B. Attachment
 - C. Penetration
 - D. Uncoating
 - E. Release

4. Which type of virus is not normally transmitted by the bite of an arthropod vector (mosquito)?
 - A. Yellow Fever
 - B. Dengue
 - C. West Nile
 - D. EEE
 - E. Rabies

5. Which of the following viruses is not commonly transmitted by shared IV drug use?
 - A. HSV
 - B. HBV
 - E. HDV

6. Immunity: Which of the following defenses are least important against viruses?
 - A. Antibody
 - B. Natural Killer Cells
 - C. Neutrophils
 - D. Cytokines
 - E. Complement

7. What is not true about Protein Kinase R (PKR)?
 - A. PKR is a potent anti-viral protein
 - B. Active PKR upregulates transcription of proteolytic enzymes which can lyse viral particles
 - C. PKR phosphorylates a protein to "unsequester" NF κ B and allow NF κ B to travel to nucleus
 - D. High levels of PKR are induced by IFN
 - E. PKR requires dsRNA and ATP for activation

8. Viruses employ many strategies to avoid host cell defences. Which is not a strategy viruses are known to use?
 - A. production of "decoy" IFN receptors
 - B. inhibition of IFN signal transduction
 - C. inhibition of PKR
 - D. production of 2-5 A polymerase
 - E. production of proteins that block TLR
 - F. inhibition of ADCC via "decoy" FcR
 - G. interference in MHC I machinery
 - H. production of immunosuppressive cytokine

9. Which of the following is NOT a direct or indirect effect of interferons?

- A. ↓ viral translation
- B. activate NK cells and Macrophages
- C. ↑ hematopoiesis, particularly effecting neutrophils, resulting in leukocytosis
- D. ↑ MHC expression
- E. ↑ neuronal excitability
- F. ↑ TNF α production
- G. ↑ synthesis of IL-15, which is a growth factor for NK cells and memory CD8+ T Cells

10. A pathologist is looking at a slide of infected tissue at an autopsy. She is trying to determine if the patient had a viral infection. What observation is not a known viral pathologic change?

- A. The presence of inclusion bodies
- B. Cellular hypertrophy
- C. The presence of multinucleated giant cells
- D. The presence of granulomas
- E. Evidence of transformation (dysplasia, etc)

11. What type of virus has a +RNA nonsegmented genome, is nonenveloped, and has a capsomere consisting of four proteins?

- A. adeno
- B. influenza
- C. picorna
- D. rubella
- E. rota

12. What is not true about picornaviruses?

- A. Picornaviruses initiate host cell lysis by inhibiting host RNA synthesis
- B. Rhinovirus is a picornavirus genus
- C. Hepatitis A is a picornavirus genus
- D. Hepatitis B is a picornavirus genus
- E. Picornaviruses can spread via aerosols or oral-fecal, depending on the genus

13. What is not true about rhinovirus?

- A. Rhinoviruses grow best at 37 degrees C
- B. Rhinoviruses spread through aerosols or contaminated surfaces
- C. Rhinovirus infections are limited to the upper respiratory tract
- D. The clinical symptoms of a Rhinovirus infection are primarily due to the destruction of cells of the upper respiratory tract
- E. Rhinoviruses are acid sensitive

Mix and Match: Vaccines

- A. Inactivated
- B. Live attenuated
- C. No Vaccine

- 14. Hepatitis A
- 15. Polio (Sabin)
- 16. Polio (Salk)
- 17. Coxsackie B
- 18. Influenza (injection)
- 19. Influenza (Flumist)
- 20. EEE
- 21. Yellow Fever
- 22. RSV

23. Influenza: Which envelope protein is incorrectly paired with its characteristic?

- A. HA (hemagglutinin) → binds to host cell glycoproteins containing sialic acid
- B. HA (hemagglutinin) → target of neutralizing Ab
- C. NA (neuraminidase) → plays no direct role in initiation of infection
- D. NA (neuraminidase) → not a target of antiviral drugs
- E. M1 → required for stability of shell structure
- F. M2 → target of antiviral drugs
- G. M2 → hydrogen ion pump
- H. M2 → important in penetration

24. Influenza: What not true about the HA protein?

- A. Cleavage of HA required for virus to become infectious
- B. Lack of a furin site on common infectious influenza (H1, H2, H3) restricts viral tropism to the respiratory tract where the correct host protease exists
- C. The high virility of the H5N1 influenza is partly due to the existence of a furin site which can allow the virus to spread systemically
- D. Membrane fusion initiated by HA in the presence of a basic environment
- E. HA spike composed of three copies of the HA protein

25. What is correct about Zanamivir (relenza)?

- A. Has the same mechanism as Rimantidine
- B. Inhibits HA
- C. Inhibits NA
- D. Inhibits M1
- E. Inhibits M2

26. Which element of the rhinovirus capsomere is the viral attachment protein (VAP)?

- A. VP1
- B. VP2
- C. VP3
- D. VP4
- E. VP1 through VP4 combine to create the VAP

27. What is correct about Amantidine?

- A. Has the same mechanism as Oseltamivir (tamiflu)
- B. Inhibits HA
- C. Inhibits NA
- D. Inhibits M1
- E. Inhibits M2

28. What is true about antigenic shift and drift?

- A. Minor changes in HA causes antigenic shift
- B. Minor changes in NA causes antigenic shift
- C. Major changes in HA causes antigenic shift
- D. Major changes in NA causes antigenic shift
- E. Antigenic drifts are responsible for the pandemics of influenza A
- F. Antigenic shifts are responsible for the moderately reduced effectivity of influenza vaccine

29. Which DNA virus does not replicate in the nucleus?

- A. Hepadna
- B. Herpes
- C. Adeno
- D. Pox
- E. Parvo
- F. Papova

30. Which DNA viruses are enveloped?

- A. Hepadna, Pox, Herpes
- B. Pox, Herpes, Adeno
- C. Herpes, Adeno, Papova
- D. Adeno, Papova, Parvo
- E. Papova, Parvo, Pox

31. What is incorrect about Togaviruses?

- A. EEE, WEE, and VEE are all togaviruses
- B. Togaviruses have -RNA
- C. Togaviruses are nonsegmented
- D. Togaviruses are enveloped
- E. Togaviruses can be carried by mosquito vectors
- F. Togaviruses can cause encephalitis

32. What is incorrect about Flaviviruses?

- A. West Nile is a Flavivirus
- B. Yellow Fever is a Flavivirus
- C. Dengue is a Flavivirus
- D. Hepatitis C is a Flavivirus
- E. Ebola is a Flavivirus
- F. + RNA
- G. nonsegmented
- H. enveloped

33. What is incorrect about Reoviruses?

- A. Cause hemorrhagic fever
- B. dsDNA
- C. segmented
- D. non-enveloped
- E. carried by tick vector

34. Do you like multiple choice tests?

- A. yes
- B. yes
- C. yes
- D. yes
- E. yes

35. Arboviruses are ARthropod BOrn viruses. Which is not true?

- A. Virus reservoir is in arthropods and small animals
- B. Human to human transmission is a common feature
- C. The virus first replicates at site of insect bite before infecting local lymph nodes
- D. Many infections can be subclinical

Monster Mix and Match: Virus Family (may be used more than once/not at all)

- A. Picornavirus
- B. Calcivirus
- C. Reovirus
- D. Flavivirus
- E. Togavirus
- F. Retrovirus
- G. Orthomyxovirus
- H. Paramyxovirus
- I. Rhabdovirus
- J. Filovirus
- K. Coronavirus
- L. Arenavirus
- M. Bunyavirus
- N. Deltavirus
- O. Hepadnavirus
- P. Herpesvirus
- Q. Adenovirus
- R. Parvovirus
- S. Papovavirus
- T. Poxvirus

- 36. "slapped cheeks" rash (erythema infectiosum) = fifth disease
- 37. vaccinia
- 38. Hepatitis A
- 39. Hepatitis B
- 40. Hepatitis C
- 41. Norwalk Virus
- 42. Rhinovirus
- 43. Measles
- 44. Poliovirus
- 45. Coxsackie Virus
- 46. HTLV
- 47. Mumps
- 48. West Nile
- 49. Yellow Fever
- 50. EEE
- 51. Rubella
- 52. Dengue
- 53. Ebola
- 54. Hantavirus
- 55. HPV
- 56. EBV
- 57. CMV
- 58. Travels up CNS by migrating in retrograde fashion up nerve axons
- 59. Parainfluenza
- 60. Colorado tick fever
- 61. Most common cause of severe diarrhea in children

62. Which virus is spread by rodent vectors?

- A. Hantavirus
- B. Togavirus
- C. Flavivirus
- D. Reovirus
- E. Bunyavirus
- F. Bornavirus

63. A 10 year old boy presents to the clinic with a rash, conjunctivitis, and coughing. Upon physical exam, you notice red blotches with white centers on his inner cheek. The next step to definitively diagnose his illness is:

- A. An antibody screen to check for the presense of anti-HA measles antibody
- B. A PPD test to check for TB
- C. You don't need to anything else because you should already know he has measles
- D. A chest X Ray
- E. A hemagglutination assay

Mix and Match: Hepatitis

- A. HAV
- B. HBV
- C. HCV
- D. HDV
- E. HEV

64. Dane particles

65. Delta antigen

66. In the same viral family as Yellow Fever

67. oral-fecal transmission, no vaccine

68. chronic infection characteristic, vaccine exists

69. most common Hepatitis in US

70. You just got back the lab results of a patient you suspect may have Hepatitis B. The results are:

HBsAg: negative

anti-HBc: negative

anti-HBs: positive

What is the HBV status of the patient?

- A. acutely infected with HBV
- B. chronically infected with HBV
- C. immune due to natural infection
- D. immune due to HBV vaccination

71. Transformed cells have many different properties compared to normal cells. Which of the following is not a typical feature of transformed cells?

- A. Potential for unlimited life
- B. Decreased contact inhibition
- C. Cytoskeletal changes associated with increased actin cables
- D. May undergo apoptosis when starved instead of entering G0
- E. May have chromosomal alterations

72. How does HPV cause cancer?

- A. E6 blocks p53 and E7 blocks Rb
- B. E7 blocks p53 and E6 blocks Rb
- C. E6 blocks BAX and E7 blocks BAK
- D. E7 blocks BAX and E6 blocks BAK
- E. The HPV antigen (L1) triggers a protooncogene growth factor receptor

73. What has nothing to do with apoptosis?

- A. Fas/FasL
- B. Caspases
- C. BCL-2
- D. BAX
- E. BCL-2
- F. SRC

74. Which group of HPVs are most high risk?

- I. 6
- II. 7
- III. 11
- IV. 16
- V. 18
- VI. 31
- VII. 45

- A. II & IV
- B. IV, V, VI, VII
- C. I, II, IV, V
- D. II, IV, V
- E. all are high risk

75. HPV: What is false?

- A. Different HPV types are associated with different kinds of warts and cancer potential
- B. HPV is necessary and sufficient to cause cervical carcinoma
- C. Over 99% of cervical carcinomas have HPV sequences
- D. HPV is among the most common sexually transmitted infections
- E. If there is a wart, there must be a papillomavirus infection

76. Which protein is not formed by cleavage of the retroviral *gag*, *pro*, or *pol* proteins?

- A. A protein found directly underneath the envelope
- B. A protein that forms the capsid
- C. A protein that covers the virion RNA
- D. A protein with a transmembrane domain through the envelope
- E. Reverse transcriptase

77. A pig is genetically engineered to remove a glycosyltransferase that catalyzes the formation of Gal alpha(1,3)Gal to cells. What is true about a kidney transplant from this pig to a human?

- A. Donor anti-Gal alpha(1,3)Gal will cause a hyperacute rejection of the xenogeneic kidney.
- B. Pig endogenous retroviruses will not be able to infect the kidney during pig development, and thus the kidney will probably be free of disease.
- C. The recipient will be at an increased risk of being infected with a pig endogenous retrovirus.
- D. Donor anti-Gal alpha(1,3)Gal will likely lyse any existing pig endogenous retrovirus.

78. Which mechanism of transformation is used by the rous sarcoma virus?

- A. Insertion: an viral-encoded oncogene is inserted into the host genome
- B. Enhancer insertion: nearby gene in the vicinity of an integrated provirus are activated
- C. Post-transcriptional activation: mRNA stability is increased
- D. Gene inactivation: insertion of provirus may inactivate host gene
- E. Promoter insertion: deregulation of host gene

Mix and match: HIV gene functions

- A. activates mRNA translation
- B. activates reverse transcriptase
- C. reduces mRNA splicing
- D. regulates degradation of APOBEC 3G
- E. increases mRNA synthesis from proviral LTR
- F. increases mRNA splicing
- G. important for viral nuclear trafficking
- H. downregulates CD4

79. What is the function of the *rev* gene?

80. What is the function of *tat* gene?

81. What is the function of *vif* gene?

82. What is another function of the gene that increases the release of budding virions?

83. What is the function of the *vpr* gene?

84. What type of HIV-1 is most infective?

- A. CCR5-expressing HIV-1 (R5)
- B. CXCR4-expressing HIV-1 (X4)
- C. CCR5 and CXCR4-expressing HIV-1 (R5X4)

Answers

1. A
2. D
3. B
4. E
5. A
6. C
7. B
8. D
9. C
10. D
11. C
12. D
13. A
14. A
15. B
16. A
17. C
18. A
19. B
20. A
21. B
22. C
23. D
24. D
25. C
26. A
27. E
28. C
29. D
30. A
31. B
32. E
33. B
34. C
35. B
36. R
37. T
38. A
39. O
40. D
41. B
42. A
43. H
44. A
45. A
46. F
47. H
48. D
49. D
50. E
51. E
52. D
53. J
54. M
55. S
56. P
57. P
58. I
59. H
60. C
61. C
62. A
63. C
64. B
65. D
66. C
67. E
68. B
69. A
70. D
71. C
72. A
73. F
74. B
75. B
76. D
77. C
78. A
79. C
80. E
81. D
82. H
83. G
84. A