

Viral life cycle

1) Clinical viral disease

- (A) Is most frequently due to toxin production
- (B) Usually follows virus infection
- (C) Can result without infection of host cells
- (D) Is associated with target organs in most disseminated viral infections

2) Linear, single-stranded DNA is the genetic material of

- (A) Calciviruses
- (B) Flaviviruses
- (C) Papillomaviruses
- (D) Parvoviruses

3) An RNA virus that has a nuclear phase to its replication process is

- (A) Coronavirus
- (B) Rhabdovirus
- (C) Retrovirus
- (D) Togavirus

4) Which one of the following statements concerning the viral replication is correct?

- A. Most RNA viruses assemble in the nucleus, whereas most DNA viruses develop solely in cytoplasm.
- B. DNA viruses must provide virtually all enzymatic and regulatory molecules needed for a complete replication cycle.
- C. Viral (+) single-stranded RNA serves as the template for complementary (–) strand synthesis using host RNA-dependant RNA polymerase.

D. In a virus with a single-stranded (ss) RNA genome of (–) polarity, (–) ssRNA is translated into viral proteins.

E. In a virus with a double-stranded RNA genome, (+) RNA strands serve both as mRNA and template for complementary (–) RNA strand synthesis.

5) The early genes of DNA viruses code primarily for proteins whose functions are required for:

- A. transcription of viral mRNA.
- B. translation of the capsid proteins.
- C. replication of the viral DNA.
- D. final uncoating of the infecting virions.
- E. processing of the mRNA precursors

6) The fringes on animal viruses like influenza virus is made up of _____

- a) lipoproteins
- b) glycoproteins
- c) cellulose
- d) polysaccharides

7) Adenoviruses exhibit which of the following symmetry?

- a) helical symmetry
- b) circular symmetry
- c) icosahedral symmetry
- d) complex structure symmetry

8) The envelope surrounding the nucleocapsid of some animal viruses is made up of which of the following structures?

- a) lipoproteins
- b) lipopolysaccharides
- c) peptidoglycan
- d) chitin

9) Which of the following is INCORRECT about the adsorption step in viral replication:

- A. In naked viruses, adsorption necessarily facilitates virus penetration.
- B. A single spike-receptor complex is insufficient for virus entry into host cell in most viruses.
- C. Influenza virus has two glycoproteins; NA has superior role in viral penetration into target cell than HA.
- D. Different viruses can use similar receptors on target cells to gain entry
- E. Neutralization of spikes by antibodies is an effective way to prevent viral entry.

10) Which of the following viruses have a complex symmetry?

- a) Alphavirus
- b) Morbillivirus
- c) Orthopoxvirus
- d) Parvovirus

11) Translation of mRNA into proteins takes place in the _____

- a) host cell nucleus
- b) host cell cytoplasm
- c) viral nucleus
- d) viral cytoplasm

12) Which of the following viruses consists of a helical nucleocapsid?

- a) Picornaviruses
- b) Togaviruses
- c) Adenoviruses
- d) Coronaviruses

13) Capsomeres are typically produced:

- A) Right after uncoating
- B) Right after penetration
- C) After genome replication
- D) In the maturation step of the virus life cycle

14) An icosahedral capsid consists of _____.

- (a) Hexagonal capsomeres
- (b) Pentagonal capsomeres
- (c) Triangular capsomeres
- (d) Both a and b

15) Positive stranded RNA viruses have which of the following characteristics?

- a) Their genome RNA can be translated directly as mRNA
- b) They have to transcribe their genome RNA to a mirror image copy as a mRNA
- c) This genome is circular
- d) Their RNA genome is segmented

16) The genome of SARS-CoV2 has been isolated. This genome was incubated with respiratory cells containing holes in their cytoplasm. What will happen to these cells?

- A) They would start to produce SARS CoV2 progeny
- B) Nothing would happen to these cells.
- C) Liquid obtained from these cells will contain only some proteins of SARS CoV2
- D) The genome will be destroyed by the cells.

17) Two viruses, X and Y, infect the same cell and begin to reproduce within the cell. As a result of the co-infection, some viruses are produced where the genome of Y is surrounded by the nucleocapsid of X and vice versa with the genome of X and nucleocapsid of Y. When the virus containing genome X surrounded by the nucleocapsid of Y infects another cell, what is the most likely outcome?

- A. Virions containing genome X and nucleocapsid Y will be produced
- B. Virions containing genome X and nucleocapsid X will be produced
- C. Virions containing genome Y and nucleocapsid Y will be produced

D. Virions containing genome Y and nucleocapsid X will be produced

E. No virions will be produced

18) Viruses can get into cells by:

- a. Receptor-mediated endocytosis
- b. Membrane fusion
- c. Direct injection of viral genomes, as seen in bacteriophages
- d. all of the above

19) Viral entry by membrane fusion typically involves;

- A) Clathrin-coated pits
- B) Interactions between viral glycoproteins and molecules on the cell surface.
- C) The virion exporting "entosomes", packages of molecules that cause pores to appear on cells
- D) No-one has any idea how this happens.

20) Which of these is not a virus replication strategy?

- A) An RNA virus bringing a reverse transcriptase into the cell with it
- B) An RNA virus re-programming a cellular RNA transcriptase to act as a reverse transcriptase
- C) A DNA virus virus encoding DNA copying machinery on its own genome
- D) A DNA virus making heavy use of cellular DNA copying machinery

21) Viruses usually initiate infection by first interacting with receptors on the surface of

cells. Which of the following statements is most accurate about cellular receptors for viruses?

- (A) Cellular receptors for viruses have no known cellular function.
- (B) All viruses within a given family use the same cellular receptor.
- (C) All cells in a susceptible host express the viral receptor.
- (D) Successful infection of a cell by a virus may involve interaction with more than one receptor.

22) After infection of a cell by a retrovirus, synthesis of progeny genomes is carried out by:

- A. the DNA-dependent RNA polymerase activity of viral reverse transcriptase.
- B. the retrovirus RNA-dependent RNA polymerase.
- C. the host cell DNA polymerase.
- D. a host cell RNA polymerase.
- E. a complex of reverse transcriptase and a second virus protein that enables it to synthesize RNA rather than DNA.

23) The most common natural mode of transmission of infection with hepatitis B virus is via:

- A. contaminated water supply
- B. body fluids, such as urine or semen
- C. inhalation of respiratory droplets
- D. direct skin-to-skin contact
- E. the bite of an infected insect vector

24) Which best describes how a virus such as herpes simplex enters a cell?

- a. as a human-adapted bacteriophage, it uses a modified form of genome injection
- b. this RNA virus enters cells by endocytosis
- c. viral glycoproteins interact with cellular entry mediating molecules such as HVEM, herpes virus entry mediator, in a complex sequence of events that leads to receptor-mediated endocytosis
- d. membrane fusion

25) Which one of the following viruses possesses an RNA genome that is infectious when purified?

- (A) Influenza virus
- (B) Poliovirus
- (C) Papillomavirus
- (D) Measles virus
- (E) Rotavirus

26) Some viruses encode for a viral RNA-dependent RNA polymerase. Which of the following states a principle about viral RNA polymerases?

- (A) All RNA viruses carry RNA polymerase molecules inside virus particles because they are needed to initiate the next infectious cycle.
- (B) Antibodies against the viral RNA polymerase neutralize virus infectivity.
- (C) Negative-strand RNA viruses supply their own RNA-dependent RNA polymerase because eukaryotic cells lack such enzymes.

(D) The viral RNA polymerase protein also serves as a major core structural protein in the virus particle.

27) The virus can acquire its spikes and envelopes precisely by:

- A) Building the envelope and spikes itself
- B) Attaching to matrix proteins and budding out of the cell
- C) The virus buds out of the cell randomly
- D) The virus associates the spikes with the production of early proteins.

1	D	11	B	21	D
2	D	12	D	22	D
3	C	13	C	23	B
4	E	14	D	24	D
5	C	15	A	25	B
6	B	16	A	26	C
7	C	17	B	27	B
8	B	18	D		
9	C	19	B		
10	C	20	B		

Viral pathogenesis

1) The eclipse period of a one-step viral multiplication curve is defined as the period of time between the

- (A) Uncoating and assembly of the virus
- (B) Start of the infection and the first appearance of extracellular virus
- (C) Start of the infection and the first appearance of intracellular virus
- (D) Start of the infection and uncoating of the Virus

2) Negri bodies are associated with

- (A) Cytomegalovirus infections
- (B) Herpes simplex virus infections
- (C) Rabies virus infections
- (D) Rubella virus infections

3) Persistent virus infections

- (A) Are usually confined to the initial site of infection
- (B) Are preceded by acute clinical disease
- (C) Elicit a poor antibody response
- (D) May involve infected carrier Individuals

4) Viral oncogenes are present in

- (A) JC virus
- (B) Human papilloma virus
- (C) Rous sarcoma virus
- (D) Simian virus 40

5) Viral oncogenes are present in all except:

- (A) Influenza
- (B) Human T-cell Lymphotropic virus type I
- (C) Adenovirus
- (D) Epstein-Barr Virus

6) Disinfection of day care center play tables with 70% ethanol is least likely to affect the viability of

- (A) Cytomegalovirus
- (B) Parainfluenza virus
- (C) Respiratory syncytial virus
- (D) Rotavirus

7) The term "eclipse period" refers to:

- A. the period between epidemic outbreaks of diseases that occur in a cyclic pattern.
- B. the period between recurrences of disease in individuals with latent virus infections.
- C. the time between exposure of an individual to a virus and the first appearance of disease.
- D. the time between infection of a susceptible cell by a cytocidal virus and the first appearance of cytopathic effects.
- E. the time between entry into the cell and disassembly of the parental virus and the appearance of the first progeny virion.

8) For diagnosis of Smallpox viruses demonstration of Negri bodies is carried out.

- a) True
- b) False

9) Where does polioviruses multiply first?

- a) skin
- b) oropharynx or intestine
- c) lymph nodes
- d) spinal cord

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- D. the time between infection of a susceptible cell by a cytocidal virus and the first appearance of cytopathic effects.
- E. the time between entry into the cell and disassembly of the parental virus and the appearance of the first progeny virion.

11) A new antiviral agent is found to prevent uncoating in a number of different viruses. At which part in the generalized virus replication cycle does uncoating occur?

- (A) Attachment, Penetration, Replication, Assembly, Release, Uncoating
- (B) Attachment, Penetration, Replication, Assembly, Uncoating, Release

(C) Attachment, Penetration, Uncoating, Replication, Assembly, Release

(D) Attachment, Uncoating, Penetration, Assembly, Replication, Release

(E) Uncoating, Attachment, Penetration, Replication, Assembly, Release

12) Which of the following is true?

- A) An episome is an active virus particle that produces proteins
- B) RNA viruses are not capable of producing tumors
- C) When acute infections of some viruses resolve, the virus may not be cleared from the body.
- D) Almost all viral infections necessitate drug administration.

13) An individual is infected with a virus that replicates causing clinical manifestations. The manifestations later subside; however, virus is not cleared from the body. Viral replication occurs continuously throughout life. Which term describes this type of infection?

- (A) Acute
- (B) Chronic
- (C) Latent
- (D) Localized
- (E) Slow

14) A 31-year-old female is referred from occupational health. A chronic infective carrier state may occur in which viral infection?

- A. Hanta virus
- B. Hepatitis A virus
- C. Hepatitis E virus
- D. Hepatitis C virus
- E. Nipah virus

15) An important step in the mechanism proposed for oncogenesis by human papillomaviruses is:

- A. inactivation of a cellular regulatory gene by human papillomavirus integration into the coding region of the gene
- B. transactivation of a normally silent cellular oncogene by a human papillomavirus early protein
- C. reversal of keratinocyte differentiation caused by continued active replication and production of progeny human papillomavirus
- D. specific binding of certain human papillomavirus early proteins to cellular antioncoproteins
- E. induction of a specific chromosome translocation that results in activation of a cellular oncogene

16) An ornithologist was on a 3-month trip to study several species of birds living in a rain forest in South America. On the 10th day of her trip, she was bitten on the hand by an unusually aggressive bat. The scientist applied a topical antibiotic ointment and continued her research. Four weeks later, the scientist lost feeling in her hand. She shortly began experiencing high fever, periods of rigidity, difficulty in swallowing liquids, drooling, and disorientation. Death followed rapidly. A postmortem biopsy of her

brain showed the presence of Negri bodies. These symptoms are consistent with:

- A. California encephalitis virus.
- B. Hantaan virus.
- C. Ebola virus.
- D. rabies virus.
- E. lymphocytic choriomeningitis virus.

17) A 25-year-old female is recalled after cervical screening. Which of the following is true regarding human papillomavirus (HPV)-associated malignancy?

- A. HPV-6 and HPV-11 are associated with genital cancers
- B. HPV-16 and HPV-18 are associated with genital cancers
- C. HPV late viral proteins inhibit tumour suppressor genes
- D. HPV-6 and HPV-11 are associated with anal in-situ neoplasia
- E. HPV late viral proteins are products of proto-oncogenes

18) Virus-infected cells often develop morphologic changes referred to as cytopathic effects. Which of the following statements about virus-induced cytopathic changes is most accurate?

- (A) They are pathognomonic for an infecting virus.
- (B) They are rarely associated with cell death.
- (C) They may include giant cell formation.

(D) They can only be seen with an electron microscope.

19) A 9-month-old girl is taken to the emergency room because of fever and persistent cough. Rales are heard in her left chest on physical examination. An infiltrate in her left lung is seen on the chest radiograph. Pneumonia is diagnosed. Which of the following is the most likely cause?

- (A) Rotavirus
- (B) Rhinovirus
- (C) Adenovirus
- (D) Respiratory syncytial virus
- (E) Coxsackievirus

20) Which one of the following is a fundamental principle of viral disease causation?

- (A) One virus type induces a single disease syndrome.
- (B) Many viral infections are subclinical and do not produce clinical disease.
- (C) The type of disease produced by a virus can be predicted by the morphology of that virus.
- (D) A particular disease syndrome has a single viral cause.

21) The skin is an impenetrable barrier to virus entry, but a few viruses are able to breach this barrier and initiate infection of the host. Which of the following is an example of a virus that enters through skin abrasions?

- (A) Adenovirus
- (B) Rotavirus

- (C) Rhinovirus
- (D) Papillomavirus
- (E) Influenza virus

22) Many viruses use the respiratory tract as the route of entry to initiate infections. Which of the following virus groups does not?

- (A) Adenovirus
- (B) Coronavirus
- (C) Hepadnavirus
- (D) Paramyxovirus
- (E) Poxvirus

23) .Which of the following statements regarding varicella and zoster are TRUE:

- A. They are one disease caused by two viruses
- B. Varicella is the primary illness, whereas zoster is the current form of the disease
- C. They have the same clinical picture
- D. Zoster is a disease of children, whereas varicella is a disease of elderly and immunosuppressed patients.
- E. Varicella vaccine is in the process of development and need another five years to be released

24) 11human papilloma viruslOtransforms cervicaloalls via thefollowing mechanism

- A. Onoogene of an acute Transforming virus

B. Over production of proto-oncogene through insertional mutagenesis

C. Transfer activating factors that turn on cellular genes causing cellular proliferation

D. Inactivation of the retinoblastoma protein (pRB)

E. Oncoogenic effect of the NS3 viral protein

a. Blood transfusion

b. Fetal contact with infected blood during childbirth

c. Ingestion of the virus via maternal breast milk

d. Transmission of the virus from hospital personnel during childbirth

e. Transplacental transmission of the virus

25) Latent pattern of viral infection is seen in

A. Rabies virus

B. Cytomegalovirus (CMV)

C. HIV

D. Respiratory syncytial virus (RSV)

E. Poliovirus

29) All of the following picornaviruses are resistant to the acidity of the stomach except:

a. Coxsackievirus A

b. Coxsackievirus B

c. Echovirus

d. Poliovirus

e. Rhinovirus

26) A sexually active 21-year-old college student presents to the local clinic with a localized eruption on the shaft of his penis. A scraping of the base of the vesicles is positive for Tzanck cells. The patient mentions that he had a similar eruption in the same area 2 months earlier. The reappearance of this eruption may be explained by:

A. Cell mediated immunity (CMI) deficiency in the patient

B. A prolonged period of viremia following the initial infection

C. A second infection with a similar virus with a different serotype

D. Failure of the patient to comply with therapy prescribed at the initial episode

E. Reactivation of a latent infection.

30) Viruses that contain two complete copies of positive-strand RNA and the enzyme reverse transcriptase are:

a. Toga viruses

b. Rhabdoviruses

c. Retroviruses

d. Reoviruses

e. Enteroviruses

28) Which one of the following infection routes are most often involved in the neonatal transmission of hepatitis B virus (HBV)?

1	C	11	C	21	D
2	C	12	C	22	C
3	D	13	B	23	B
4	B	14	D	24	D
5	A	15	D	25	B
6	D	16	D	26	E
7	E	17	B	27	E
8	B	18	C	28	B
9	B	19	D	29	E
10	E	20	B	30	C

Viral immunology

1) The first viral-induced defense mechanism in a nonimmune individual is the

- (A) Generation of cytotoxic T lymphocytes
- (B) Production of interferon
- (C) Synthesis of lymphokines
- (D) Synthesis of neutralizing antibodies

2) A new immune modulator is developed which enhances early immunologic responses to viral infection. Which of the following is the earliest immunological event that could be the target of this new drug?

- (A) Activation of natural killer cells
- (B) Activation of naïve viral-specific B cells
- (C) Activation of naïve viral-specific T cells
- (D) Antigen presentation by dendritic cells
- (E) Production of IFN- γ by antiviral cytotoxic T cells

3) A 21-year-old female presents with a fever, adenopathy and a rash. Blood tests demonstrate a lymphocytosis. Serological diagnosis of a primary viral infection may be made by detection of which viral-specific immunoglobulin?

- A. IgA
- B. IgD
- C. IgE
- D. IgM
- E. IgG

4) Respiratory syncytial virus infects a previously exposed host, which of the following will prevent the virus from colonizing the respiratory tract?

- A) RSV-specific IgA
- B) Any IgA
- C) Interferon alpha
- D) Specific IgG

5) Killing of liver cells infected with hepatitis B virus is primarily caused by:

- A. shut-off of cellular protein synthesis.
- B. intracytoplasmic accumulation of hepatitis B virus antigen aggregates.
- C. degradation of cellular mRNA.
- D. attack by cytotoxic T lymphocytes directed against hepatitis B virus antigens.
- E. virus-induced aberrant chromosome rearrangements and deletions.

6) Which of the following statements about T cells is false?

- A) Helper T cells release cytokines while cytotoxic T cells kill the infected cell.
- B) Helper T cells are CD4+, while cytotoxic T cells are CD8+.
- C) MHC II is a receptor found on most body cells, while MHC I is a receptor found on immune cells only.
- D) The T cell receptor is found on both CD4+ and CD8+ T cells.

7) In the broadest terms, which of the following does not adequately describe the role of the interferons during infectious process of mammals

A) Interferons work in part, by binding to cognate cell-surface receptors on the cells that have secreted them

B) Interferons main mechanism of action is to decrease viral replication in neighboring cells

C) Can be used in the treatment of hepatitis infections

D) Secreted by cells of the immune system and cells not part of the immune system.

8) Which of the following about mammalian B lymphocytes is a true statement?

A) B lymphocytes need MHC molecules to be properly activated

B) Can secrete antibodies to certain viruses without previous exposure

C) B cells are induced to make specific antibodies in response to foreign antigen

D) Can only secrete antibodies in the presence of T cells

9) In humans, MHC class II molecules are expressed by

A. all nucleated cells.

B. B cells, dendritic cells, and macrophages.

C. erythrocytes.

D. mast cells.

E. naive T cells.

10) The constant regions of the five major types of heavy chains of immunoglobulin molecules dictate the molecule's

A. epitope.

B. Fab fragment.

C. isotype.

D. tyrosine activation motif.

E. variable domain.

11) Which of the following molecules is expressed by a mature T cell that functions as a helper T cell?

A. CD4

B. CDS

C. GlyCAM-1

D. IgA

E. IgG

12) Which of the following is the predominant immunoglobulin isotype secreted in the human mucosa?

A. IgA

B. IgD

C. IgE

D. IgG

E. IgM

13) A Fab fragment:

- A. Is produced by pepsin treatment.
- B. Is produced by separation of heavy and light chains.
- C. Binds antigen.
- D. Lacks light chains.
- E. Has no interchain disulfide bonds.

14) Interferons are an important part of the host defense against viral infections. What is interferon's principal mode of action?

- (A) It is present in the serum of healthy individuals, providing a viral surveillance role.
- (B) It coats viral particles and blocks their attachment to cells.
- (C) It induces synthesis of one or more cellular proteins that inhibit translation or transcription.
- (D) It protects the virus-infected cell that produced it from cell death.

15) Which one of the following phrases accurately describes viral neutralizing antibodies?

- (A) Directed against viral protein determinants on the outside of the virus particle
- (B) Appear in the host sooner after viral infection than interferon
- (C) Directed against viral nucleic acid sequences
- (D) Induced only by disease-causing viruses
- (E) Of little importance to immunity to viral infection

16) Which one of the following statements concerning interferons is least accurate?

- (A) Interferons are proteins that influence host defenses in many ways, one of which is the induction of an antiviral state.
- (B) Interferons are synthesized only by virus-infected cells.
- (C) Interferons inhibit a broad range of viruses, not just the virus that induced the interferon.
- (D) Interferons induce the synthesis of a ribonuclease that degrades viral mRNA.

17) The basic Ig unit is composed of:

- A. 2 identical heavy and 2 identical light chains.
- B. 2 identical heavy and 2 different light chains.
- C. 2 different heavy and 2 identical light chains.
- D. 2 different heavy and 2 different light chains.
- E. Non-covalently bound polypeptide chains.

18) Ig idiotypes (isotype) are found:

- A. In the constant region of the heavy chain.
- B. In the constant region of the light chain.
- C. In the hinge region.
- D. In the variable region of both heavy and light chains.
- E. Only in the light chain.

19) C3b:

- A) Is chemotactic.
- B) Is an anaphylatoxin.
- C) Opsonizes viruses.
- D) Directly injures bacteria.
- E) Is the inactive form of C3.

20) Which of the following is a distinction between the innate and adaptive immune systems?

- a. the ability of the cells of only one system to produce cytokines.
- b. the capacity for exquisite antigenic specificity in only one system.
- c. the capacity of only one system to recognize virally infected cells.
- d. the ability of cells of only one system to mediate cell cytotoxicity.

21) CD8 is a marker of:

- A) B-cells
- B) Helper T-cells
- C) Cytotoxic T-cells
- D) An activated macrophage
- E) A neutrophil precursor

22) Upon encountering an appropriate pMHC I on an infected cell:

- A. B-cell receptors become cross-linked and signaling ensues.
- B. CD4+ cells release IL-4.
- C. CD8+ cytotoxic T cells destroy the infected cell.
- D. Naïve Th1 cells secrete cytokines.
- E. Th0 cells differentiate into Th2 cells

23) The first antibody to be released during an immune response:

- A) IgM
- B) IgA
- C) IgG
- D) IgE
- E) IgD

24) Which antibody continues to be secreted throughout life and provides life-long immunity:

- A) IgM
- B) IgA
- C) IgG
- D) IgE
- E) IgD

25) For the MMR vaccine to be effective, the measles virus must include all the following characteristics except:

- A) Do not vary their antigens
- B) Decrease the level of MHC class II.
- C) Do not establish latent infection within host cells
- D) Do not interfere with the host immune response

1	B	11	A	21	C
2	A	12	A	22	C
3	D	13	C	23	A
4	A	14	C	24	C
5	D	15	A	25	B
6	C	16	B		
7	A	17	A		
8	C	18	B		
9	B	19	C		
10	C	20	B		

Viral Genetics

1) The exchange of homologous segments of RNA between two different influenza type A viruses is called

- (A) Complementation
- (B) Genetic reassortment
- (C) Phenotypic masking
- (D) Phenotypic mixing

2) Which of the following mechanisms will produce a single new amino acid in the protein?

- A) Point mutation
- B) Frameshift mutation
- C) Reassortment
- D) Complementation

3) From 1918 until 1956, the only subtype of influenza observed in humans was H1N1. In 1957, H1N1 was replaced by H2N2. This is an example of:

- A. viral interference.
- B. phenotypic mixing.
- C. antigenic shift.
- D. antigenic drift.
- E. viral transformation.

4) Rotaviruses differ from polioviruses in that rotaviruses:

- A. infect via the fecal–oral route.
- B. lack an envelope.
- C. can undergo genetic reassortment.
- D. do not contain any enzymes.
- E. have an icosahedral structure.

5) Between two chromosomes the exchange of gene is called as

- A) Interaction
- B) Mutation
- C) Recombination
- D) Point mutation

6) During the process of complementation, the helping virus mediate the replication in the

- A) Prion
- B) Virion
- C) Viroid
- D) Defective virus

7) Two mutants of poliovirus have been isolated, one (MutX) with a mutation in gene X and the second (MutY) with a mutation in gene Y. If cells are infected with each mutant alone, no virus is produced. If a cell is coinfecting with both MutX and MutY, which one of the following is most likely to occur?

- (A) Reassortment of genome segments may occur and give rise to a viable wild-type virus.
- (B) The genomes may be reverse transcribed to DNA and both MutX and MutY viruses produced.
- (C) Complementation between the mutant gene products may occur and both MutX and MutY viruses produced.
- (D) The cells will transform at high frequency because they will not be killed by the poliovirus mutants.

8) For the mutation shown below determine:

1. Whether it is a substitution mutation or an insertion/deletion mutation
2. The specific type of mutation.

GCC-CCU-AGU-GGA (ala-pro-ser-gly) mutates to GAC-CCC-UAG-UGG-A (asp-pro-stop)

- A. Insertion/deletion mutation, frameshift causing nonsense mutation
- B. Substitution mutation/Nonsense mutation
- C. Insertion/deletion mutation, Frameshift causing missense mutation
- D. Substitution mutation/Silent mutation

9) Or the following mutation, which is more likely to have no phenotypic consequence?

- A) Frameshift mutation
- B) Missense mutation
- C) Synonymous mutation
- D) Nonsense mutation
- E) Silent mutation

10) Because influenza virus is segmented, when two different strains infect the same cell, a major change in the virus can occur that is called:

- A) Antigenic shift
- B) Antigenic drift
- C) Hybridization
- D) Viral mutation

11) The treatment of HIV or HCV usually contain a combination of 2-3 drugs, this is because:

- A) to prevent mutations
- B) To prevent inflammation
- C) To fix damaged hepatocytes
- D) To stimulate neutralizing antibodies

12) Why can't selection act on viral mutations that are synonymous?

- A) Synonymous mutations change a base to a different base and then change it back during the next round of replication.
- B) The amino acid sequence is not altered.
- C) These mutations are recessive and are not visible until both copies are the same.
- D) These mutations are too rare.
- E) Viruses do not have mutations.

13) All the following are true except:

- A) Rotavirus and influenza virus have different genomes but can undergo reassortment.
- B) Coronavirus has a higher mutation rate than poxvirus
- C) Vaccine for DNA viruses is easier than RNA viruses
- D) Influenza virus does not undergo missense mutations.

14) The hepatitis C virus has a very high rate of mutation. How might this help the virus escape an antiviral drug?

- A) Viral mutation that break or inactivate viral genes could make the virus more dangerous.
- B) The high mutation rate makes it more likely that your body will be resistant to the drug
- C) The high mutation rate makes the virus replicate faster, and that makes it harder to control
- D) Missense mutations in the virus can new-drug resistant variants of the virus.

15) RNA viruses can create new genomes by:

A) Starting transcription of the genome on one strand of RNA and then jumping to the other strand.

B) Cutting a part of one genome and replacing it with part of another genome.

C) RNA-dependent RNA polymerase is error prone.

D) all of the above.

16) Regarding viral genetics, which of the following statements is CORRECT?

A. Copy choice recombination occurs in retroviruses only

B. Reassortment is responsible for pandemic outbreaks which occur every 7 to 10 years in segmented viruses

C. In copy choice recombination the replication enzyme has the ability to jump from one location to another on the same strand

D. Frame shift mutation is associated with the introduction of stop codon into the growing chain of genetic material

E. The missense mutation occurs as a result of introduction of point mutation at the codon's third position

17) Which of the following is TRUE about Defective Interfering particles (DIs)

A. The newly produced viruses are mostly infectious

B. The DIs do not affect healthy virus replication when coinfection occurs since they cannot replicate

C. DIS represent a small minority of newly produced progeny virions

D. Virus passage at low MOI increases the number of DIs.

E. Complementation at the protein level help defective viruses in producing new progeny

18) All of the following are true regarding reassortment EXCEPT:

A. The reassortment concept is exploited in the generation of Reovirus vaccine

B. Reassortment is also referred to as genetic drift

C. Reassortment occurs during Influenza virus replication.

D. It occurs in segmented viruses only

E. Reassortment is associated with increased virulence and outbreaks of viral infections.

19) Viral surface proteins have various roles to play for their survival and in pathogenesis. Which of the following statement is most accurate about them?

a. Misfolded viral surface proteins cause prions disease.

b. They act as proteases that degrade cellular proteins leading to cell death.

c. They are the polymerases that synthesize viral messenger RNA.

d. Neutralizing antibodies are formed against viral surface proteins.

e. They play role in the regulation of viral transcription.

20) Enveloped viruses are more easily inactivated by lipid solvents and detergents than viruses that do not have an envelope.

Which one of the following viruses is the most sensitive to inactivation by lipid solvents and detergents?

- a. Coxsackie virus
- b. Hepatitis A virus
- c. Herpes simplex virus
- d. Poliovirus
- e. Rotavirus

1	B	14	D
2	A	15	D
3	C	16	B
4	C	17	E
5	C	18	B
6	D	19	D
7	C	20	C
8	A		
9	E		
10	A		
11	A		
12	A		
13	D		

Viral tests

1) Many viruses can be grown in the laboratory. Which of the following statements about virus propagation is not true?

- (A) Some viruses can be propagated in cell-free media.
- (B) Some mammalian viruses can be cultivated in hen's eggs.
- (C) Some viruses with broad host ranges can multiply in many types of cells.
- (D) Some human viruses can be grown in mice.
- (E) Most virus preparations have particle-to-infectious unit ratios greater than 1.

2) Which of the following statements is true of the Western Blot?

- A) A Western Blot allows us to see all the proteins in a given sample.
- B) A Western Blot exploits antibodies in order to see a particular protein in a given sample.
- C) A Western Blot is commonly used as a protein purification step.
- D) it is mainly similar to sandwich ELISA.

3) You are using indirect (sandwich) immunofluorescence to study the subcellular localization of Hsp70 in cultured mouse cells. Which of the following antibody sets would be suitable for this purpose?

- A) Mouse antibody against human Hsp70, and a fluorescently-tagged goat antibody against human antibodies.
- B) Rabbit antibody against mouse Hsp70, and a fluorescently-tagged goat antibody against rabbit antibodies.

C) rabbit antibody against mouse Hsp70, and a fluorescently tagged mouse antibody against human Hsp70.

D) goat antibody against fluorescently-tagged rabbit antibodies, and a human antibody against goat antibodies.

E) Any of the above.

4) Which of the following statement about the complement fixation test is false?

- A. Includes RBCs tagged with lysins
- B. The more complement that is used, the less sensitive the test will be.
- C. In a negative complement fixation test, complements are fixed to the antigen-antibody complex.
- D. A negative complement fixation test is detected by hemolysis
- E. There are two steps, the complement fixation step and the indicator step

5) Which of the following is false regarding complement fixation test:

- A. No hemolysis indicates that the patient has the infection or had the infection in the past.
- B. The complement fixation test looks for the presence of specific antigens in the patient's serum.
- C. No hemolysis indicates that the patient has the antibody being tested for
- D. When complement does not bind with the RBCs, it results in hemolysis.

6) A type of cell culture that can reproduce for an extended number of generations and is used to support viral replication is a :

- a. Primary cell culture
- b. Continuous cell line
- c. Cell strain
- d. Diploid fibroblast cell
- e. Connective tissue

7) An HIV-positive patient asks you if you can tell him the chances of him progressing to symptomatic AIDS, which one of the following tests would be of most use:

- A. CD4 lymphocyte count
- B. HIV antibody test
- C. HIV real-time PCR
- D. Neopterin
- E. HIV p24 antigen.

8) Which of the following is CORRECT regarding virological tests?

- A. Direct viral examination includes light microscopy visualization of viral size and structure
- B. Indirect viral examination includes viral titer quantification in cell culture
- C. Serological methods include amplification of genetic material of specific viruses
- D. Western blotting is a molecular method in which specific viral proteins are targeted
- E. In complement fixation test the presence of an antibody in the serum activates the complement component after adding the antigen of interest leading to a reactive test

9) In a direct fluorescent antibody test, which of the following would we most likely be looking for using a fluorescent labelled antibody?

- A) bacteria in a patient sample
- B) bacteria isolated from a patient and grown on agar plates
- C) antiserum from a patient smeared onto a glass slide
- D) antiserum from a patient that had bound to antigen coated beads

10) You are using indirect (sandwich) immunofluorescence to study the subcellular localization of Hsp70 in cultured mouse cells. Which of the following antibody sets would be suitable for this purpose?

- A) Mouse antibody against human Hsp70, and a fluorescently-tagged goat antibody against human antibodies.
- B) Rabbit antibody against mouse Hsp70, and a fluorescently-tagged goat antibody against rabbit antibodies.
- C) rabbit antibody against mouse Hsp70. and a fluorescently tagged mouse antibody against human Hsp70.
- D) goat antibody against fluorescently-tagged rabbit antibodies, and a human antibody against goat antibodies.
- E) Any of the above.

11) A direct fluorescence antibody (FA) test uses:

- A) A fluorescently tagged antigen to bind and detect an unknown antigen from a patient sample.
- B) A fluorescently tagged antibody to bind and detect an unknown antigen from a patient sample.
- C) a fluorescently tagged antibody to bind and detect an unknown antibody from a patient sample.
- D) A fluorescently tagged antigen to bind and detect an unknown antibody from a patient sample.

12) A phenomenon in which the viral glycoproteins bind to RBCs and aggregate them in a viral suspension sample is called:

- A. Hemoglobin lysis
- B. Haemagglutination
- C. Haemolysis
- D. Cytopathic effect
- E. Haemadsorption

13) Which of the following pairs match CORRECTLY:

- A. Permissive cells / Early protein only production
- B. Nonpermissive cells / Abortive virus infection
- C. HIV / Classic recombination
- D. Rotavirus / Negri bodies
- E. Human papilloma virus (HPV) / Uterine cancer

1	A	6	B	11	B
2	B	7	A	12	B
3	B	8	E	13	B
4	C	9	A		
5	B	10	B		

Antivirals

1) Amantadine inhibits

- (A) Influenza A and B virus hemagglutinin binding activity
- (B) Influenza A virus M2 protein activity
- (C) Influenza A and B virus neuraminidase activity
- (D) Influenza B virus RNA dependent RNA polymerase activity

2) Antiviral nucleoside analogs

- (A) Are effective only against replicating viruses
- (B) Include foscarnet
- (C) Inhibit replicases
- (D) May block viral penetration

3) Which drug is used for healing genital herpes?

- a) acyclovir
- b) penicillin
- c) erythromycin
- d) tetracycline

4) Acyclovir is largely ineffective in the treatment of human cytomegalovirus infections because:

- A. human cytomegalovirus exhibits a high rate of mutation in the target enzyme.
- B. human cytomegalovirus depends upon the host cell's DNA polymerase for replication of its DNA.
- C. human cytomegalovirus lacks the thymidine kinase required for activation of acyclovir.

D. the tissues in which human cytomegalovirus multiplies are largely inaccessible to the drug.

E. human cytomegalovirus codes for an enzyme that inactivates the drug.

5) Current approaches to acquired immune deficiency syndrome therapy involve the use of multiple drugs because:

- A. it is not known which one will be effective.
- B. mutants resistant to any one drug appear rapidly, but the chance for appearance of mutants resistant to all of them is small.
- C. all inhibit the same step in replication, thereby increasing their effectiveness.
- D. this is the most effective means of curing cells of integrated human immunodeficiency virus genomes.
- E. each tends to neutralize the toxicity of the others.

6) Which of these viruses can be treated with an inhibitor of reverse transcriptase?

- a) HIV 2
- b) HBV
- c) HCV
- d) HCMV

7) Which of the following compound inhibits the entry of the HIV-1 virus?

- a) Zanamivir
- b) Oseltamivir
- c) Pleconaril
- d) Enfuvirtide

8) A 40-year-old man has HIV/AIDS characterized by a low CD4 count and a high viral load. Highly active antiretroviral therapy (HAART) will be initiated. One of the drugs under consideration is a nucleoside analog that inhibits viral reverse transcriptase and is active against both HIV and hepatitis B virus. That drug is

- (A) Acyclovir
- (B) Amantadine
- (C) Ribavirin
- (D) Saquinavir
- (E) Lamivudine
- (F) Fuzeon

9) Regarding the HIV/AIDS patient in Question 8, a peptidomimetic agent that blocks virus-mediated cleavage of viral structural protein precursors is chosen as a second drug. That drug is

- (A) Acyclovir
- (B) Amantadine
- (C) Ribavirin
- (D) Saquinavir
- (E) Lamivudine
- (F) Fuzeon

10) A 63-year-old woman is hospitalized for treatment of leukemia. One day after admission she develops chills, fever, cough, headache, and myalgia. She states that her husband had a similar illness a few days earlier. There is major concern about a respiratory virus outbreak in the staff of the chemotherapy ward and in the patients on that ward. A synthetic amine that

inhibits influenza A virus by blocking viral uncoating is chosen for prophylactic treatment of the staff and patients. That drug is

- (A) Acyclovir
- (B) Amantadine
- (C) Ribavirin
- (D) Saquinavir
- (E) Lamivudine
- (F) Fuzeon

11) Which of the following statements is INCORRECT about Acyclovir:

- A. Lacks a 3'OH group and therefore causes chain termination when incorporated into DNA.
- B. It is the drug of choice for CMV treatment through phosphorylation of UL-97.
- C. Is a nucleoside analogue.
- D. Is phosphorylated primarily by the herpes simplex thymidine kinase but not by the host cell kinases.
- E. Can be used by the herpes virus DNA polymerase in its triphosphorylated form and incorporated into DNA.

12) Protection against influenza A virus in a nonimmune individual can be achieved through the administration of a drug that interferes with

- a. viral endonuclease activity
- b. binding of host messenger RNA (mRNA) caps by the viral P1 protein
- c. synthesis of viral progeny RNA
- d. uncoating of nucleic acid
- e. viral adsorption and penetration

1	B	5	B	9	D
2	A	6	A	10	B
3	A	7	D	11	B
4	C	8	E	12	D