

Antiviral drugs

Test your knowledge!

Q1: A 27 year old women presented with fever, malaise, and right upper quadrant pain. Blood tests reveals she has elevated liver enzymes and serology tests is suggesting hepatitis B virus infection. The following antiviral must be included in the prescription of hepatitis B virus (HBV)?

- A. Gemcitabine
- B. Didanosine
- C. Lamivudine**
- D. Rifampin

Q2: A 23 year old immunocompetent woman sees her physician with painful vesicles on her labia vulva. We suspect herpes simplex infection on clinical grounds and recommend which of the following?

- A. Acyclovir**
- B. Saquinavir
- C. Idoxuridine
- D. Indinavir

Q3: Which of the following drugs by blocking the cleavage of the HIV polyproteins?

- A. Maraviroc
- B. Enfuvirtide
- C. Saquinavir**
- D. Lamivudine

Q4: A 25-year-old man with multiple sexual partners begins to have flulike symptoms. He visits his primary care physician who recommends an HIV screening test. He was found to have an HIV infection and begun a drug regimen. Which of the following works by blocking the cleavage of the HIV polyproteins?

- A. Lamivudine
- B. Enfuvirtide
- C. Maraviroc
- D. Saquinavir**

Q5: A 70 year old man presents to accident and emergency with a 1 day history of a unilateral painful rash across his trunk. He has past medical history of hypertension and hypercholesterolemia. On examination, there is a well demarcated herpetic blistering rash on the right side of his trunk. What is the most appropriate treatment?

- A. Chloramphenicol
- B. Acyclovir**
- C. Tetracycline
- D. Fluconazole

Q6: Which statement about the mechanisms of action of antiviral drugs is accurate?

- A. Acyclovir has no requirement for activation by phosphorylation
- B. Ganciclovir inhibits viral DNA polymerase but does not cause chain termination
- C. Increased activity of host cell ribonucleases that degrade viral mRNA is one of the actions of interferon- α**
- D. The initial step in activation of foscarnet in HSV-infected cells is its phosphorylation by thymidine kinase

Q7: Interferon- α and rifampin share one common adverse effect which is?

- A. Inhibition of Liver Enzymes
- B. Red-orange fluid discoloration
- C. Flu-like symptoms**
- D. All of the above

Q8: Which of the following is an anti-hepatitis agent?

- A. Tenofovir
- B. Simeprevir**
- C. Zanamivir
- D. Nevirapine

Q9: In an accidental needlestick, an unknown quantity of blood from an AIDS patient is injected into a resident physician. The most recent laboratory report on the AIDS patient shows a CD4 count of $20/\mu\text{L}$ and a viral RNA load of greater than 107 copies/mL. The most appropriate course of action regarding treatment of the resident is to

- A. Determine whether HIV transmission has occurred by monitoring the patient's blood
- B. Treat with a single high dose of zidovudine
- C. Treat with full doses of zidovudine for 4 wk
- D. Treat with zidovudine plus lamivudine plus ritonavir for 4 wk**

Q10: More than 90% of this drug is excreted in the urine in intact form. Because its urinary solubility is low, patients should be well hydrated to prevent nephrotoxicity. Which drug is described?

- A. Acyclovir**
- B. Efavirenz
- C. Indinavir
- D. Trifluridine

Q11: A 27-year-old nursing mother is diagnosed as suffering from genital herpes. She has a history of this viral infection. Previously, she responded to a drug used topically. Apart from her current problem, she is in good health. Which drug to be used orally is most likely to be prescribed at this time?

- A. Amantadine
- B. Foscarnet
- C. Ritonavir
- D. Valacyclovir**

Q12: Which of the following statements about interferon- α is false?

- A. At the start of treatment, most patients experience flu-like symptoms
- B. Indications include treatment of genital warts
- C. It is used in the management of hepatitis B and C
- D. Lamivudine interferes with its activity against hepatitis B**

Q13: A 24-year-old female is diagnosed with genital herpes simplex virus infection. Which of the following agents is indicated for use in this diagnosis?

- A. Valacyclovir.**
- B. Cidofovir.
- C. Ganciclovir.
- D. Zanamivir.

Q14: At a routine clinic visit, a 40-year-old man with a long history of AIDS was found to have a CD4+ lymphocyte count of 122 cells/mm³ (normal > 500 cells/mm³) despite his current highly active antiretroviral therapy. The physician decided to change the therapy and to include a drug that blocks the integration of reverse-transcribed HIV DNA into the chromosomes of host cells. Which of the following drugs was most likely given?

- A. Zidovudine
- B. Atazanavir
- C. Lopinavir
- D. Raltegravir**

Q15: Which anti-viral medication is associated with flu-like symptoms as adverse effect?

- A. Oseltamivir
- B. Amantadine
- C. Interferon Alpha**
- D. Lamivudine

Q16: Which class of direct acting antivirals for hepatitis c works by inhibiting the formation of the membranous web that provides a platform for viral replication?

- A. NS3/NS4A Protease inhibitors
- B. NS5B polymerase inhibitors
- C. NS5A replication complex inhibitors**
- D. Interferons

Q17: A 27-year-old man with HIV disease and hepatitis B is hospitalized for treatment of his hepatitis B. He has begun on intravenous treatment with interferon alpha. After administration he develops fever, chills, and myalgias. Physical examination reveals that the lungs are clear to auscultation bilaterally. What is the most likely explanation for this reaction?

- A. Drug toxicity
- B. Expected adverse event**
- C. Underlying pneumonia
- D. None of the above

Q18: 32-year-old man with hepatitis B refractory to several treatment has begun on a course of Lamivudine. The mechanism of action of this medication likely involves which of the following?

- A. HBV DNA polymerase**
- B. HBV RNA polymerase
- C. HBV RNA synthetase
- D. HBV RNA transferase

Q19: A 25 year old man with multiple sexual partners begin to have flu like symptoms. He visits his doctor who recommends an HIV screening test based on his history. He is found to have HIV infection and begins a drug regimen. Which of the following works by inhibiting fusion of the virion with T cells?

- A. Darunavir
- B. Stavudine
- C. Maraviroc**
- D. Delavirdine

Q20: 27-year-old man has been hospitalized with fatigue and feeling sick for the past four months. After many tests and labs, an HIV test is performed and comes back positive. His HIV viral load is 36,000 and his CD4 count is 369. He started on multi drug therapy for his HIV disease. One of the drugs is raltegravir. is the mechanism of action of raltegravir?

- A. Binds to viral gp41
- B. Inhibits integrate**
- C. Inhibits protease
- D. Inhibits reverse transcriptase

Q21: Highly active antiretroviral therapy (HAART) in HIV infection is associated with which of the following?

- A. A decrease in viral mRNA copies/mL of blood
- B. A decrease in the rate of emergence of drug resistance
- C. A possible increase in CD4 cell count
- D. A reduced incidence of opportunistic infections
- E. All of the above**

Q22: Oseltamivir and zanamivir are available for treatment of infections due to influenza A and B. The mechanism of their antiviral action is inhibition of which of the following?

- A. RNA polymerase
- B. Reverse transcriptase
- C. Aspartate protease
- D. Neuraminidase**

Q23: Viral uncoating belongs to which phase of viral replication?

- A. Phase 1
- B. Phase 2**
- C. Phase 3
- D. Phase 4

Q24: Which of the following is a non nucleoside reverse transcriptase inhibitor?

- A. Maraviroc
- B. Tenofovir
- C. Emcitrabine
- D. Nevirapine**

Q25: Which of the following is an anti influenza agent among elderly with anti parkinsonsonial effect?

- A. Oseltamivir
- B. Zanamivir
- C. Ribavirin
- D. Amantadine**

Q26: Which of the following anti viral agent is a nucleotide inhibitor with activity against hepatitis infection?

- A. Acyclovir
- B. Lamivudine
- C. Ritonavir
- D. Adefovir**

Q27: Gamma globulins can be given to provide passive immunity to the virus every 2-3 weeks via which route?

- A. Oral
- B. S.C
- C. Rectal
- D. I.M**

Summarization

Steps of viral infection and replication:

Phase 1: Attachment and penetration: The viruses attach and bind to the host cell membrane. Specific receptor sites on the host cell are recognized by corresponding areas on the specific virus. Then, the receptor-virus complex penetrates the cell and is encapsulated by host cell cytoplasm.

Phase 2: Uncoating: The protein coat of the virus is dissolved liberating free DNA or RNA i.e. the viral genome.

Phase 3: Synthesis of viral components: The genome of the virus is duplicated and viral proteins are synthesized. At this time, host synthesis of nucleic acid and or protein is inhibited because the synthetic processes of host cell are directed for synthesis of viral components.

Phase 4: Assembly of the virus particle and their release from the cell: The viral genome is encapsulated by viral protein. The mature virus is then released from cell.

Treatment of replication of HIV:

- Nucleosides analogue reverse transcriptase inhibitors drugs: **Zidovudine** (cheap, famous drug), **Lamivudine** (HCV, HBV treatment), **Emcitrabine**.
- Nucleotide analogue reverse transcriptase inhibitors: **Tenofovir** (used in HCV too)
- Non-nucleoside reverse transcriptase inhibitors: **Nevirapine**
- Fusion inhibitors (**Phase one attachment inhibitors**): **Maraviroc** (glycoprotein 120)
- Protease inhibitors: **Indinavir**, **Ritonavir**, **Saquinavir**
- Integrase inhibitors (prevent DNA to go inside the nucleus): **Raltegravir**

Anti-Influnza Agents:

Amantadine, Zanamivir, Oseltamivir

Anti-herpes Agents:

Acyclovir

Anti-hepatitis Agents:

Lamivudine (nucleoside reverse transcriptase inhibitors), **Adefovir** (Nucleotide inhibitor), **Interferon Alfa**, **pegylated interferon Alfa**, **Ribavirin**, **Soberuvir**.

Antiviral Agents:

I. Inhibition of attachment to or penetration of host cells:

Gamma Globulins (Immuno Globulins) **I.M**

II. Inhibition of viral uncoating:

Amantadine (give in case of flu+ Parkinsonism)

III. Inhibition of synthesis of viral components (Non-structural protein, DNA and RNA):

Acyclovir, interferons.

IV. Inhibition of assembly or relase of viral particles:

Rifampin (have flu like symptoms)

