

Chemotherapeutics & PNS Sample Exam

- Which of the following antiviral drugs could be described as a chain terminating pro-drug?
 - Acyclovir
 - Valacyclovir
 - Pencyclovir
 - Gancyclovir
 - Valganciclovir
- An asian patient is on medications for tuberculosis, but he is not getting better. What is a reasonable reason for him not getting better despite being prescribed anti-TB medications?
 - One medication may be metabolized too quickly to an inactive, secreted product.
 - He may have stopped taking one medication because he noticed his bodily secretions turned orange
 - He may have stopped taking one medication because he noticed changes in his vision
 - He may have developed a resistant form of TB due to noncompliance
 - All of the above
- You are monitoring a patient on a certain anticancer drug. Initially the patient experienced hand and foot syndrome, which you attribute to that drug. Now, however, the patient's cancer seems to have developed resistance to the drug in question. What enzyme was most likely to have mutated?
 - Hypoxanthine-guanine phosphoribosyl transferase
 - Xanthine oxidase
 - Thymidylate synthase
 - Dihydrofolic acid reductase
 - CYP450
- As a precocious second year medical student, you notice on a patient's chart that the patient is being administered Leucovorin. What is true about another drug that that patient is almost definitely receiving for cancer chemotherapy?
 - The other drug looks nearly identical to folic acid
 - The other drug is activated by HGPRT
 - The other drug causes cardiotoxicity
 - The other drug inhibits thymidylate synthase
 - The other drug does not have significant CNS or hepato-toxicities
- One of Dr. Clive's patients presents to you with an asymmetrically enlarged, painless testicle. After taking a careful history, he confides in you that he has adult polycystic kidney disease. His creatinine is 4.3. Which drug would you prescribe?
 - Carboplatin
 - Cisplatin
 - Foscarnet
 - Streptomycin
 - Estrogen

Mix and match: NRTI's (more than once or not at all)

- Zidovudine
 - Didanosine
 - Abacavir
 - Stavudine
 - Lamivudine
 - Tenofovir
- Which drug would base pair to Adenine?
 - Which drug has sensory neuropathy as a toxic effect?
 - Which drug is a nucleotide analog?
 - Which drug's base is inosine?
 - Which drug is an ester prodrug?
 - Which drug is used for both HIV and HBV therapy?

12. Acyclovir and Zidovudine are both nucleoside analogs. What is true about both of them?

- A. They are both chain terminators when incorporated into DNA
- B. They both contain a purine base
- C. They are both phosphorylated by viral thymidine kinase
- D. They are both metabolized by hepatic conjugation
- E. They both have myelosuppression as a toxic side effect

13. Why is Ganciclovir not used as a first line agent for HSV?

- A. Because HSV does not contain the UL97 enzyme needed to phosphorylate ganciclovir
- B. Because myelosuppression is a pretty serious side effect for a cold sore
- C. Because HSV thymidine kinase converts ganciclovir into a toxic form
- D. Because ganciclovir might crystallize in the urinary tract

Mix and Match: Cell Cycle (more than once or not at all)

- A. M phase
 - B. Between M and G1 phase
 - C. G1 phase
 - D. Between G1 and S phase
 - E. S phase
 - F. Between S and G2 phase
 - G. G2 phase
 - H. Between G2 and M phase
 - I. all phases equally
 - J. primarily S phase, but other phases as well
14. This drug's primary toxicity is pulmonary fibrosis
15. This drug can cause endometrial cancer
16. Vincristine
17. This drug blocks topoisomerase I
18. This drug blocks topoisomerase II
19. This drug can lead to irreversible heart failure (cardiomyopathy)
20. This drug prevents tubulin depolymerization
21. This drug may cause hyperuricemia and gout during treatment
22. This drug can cause serious skin vesication

23. What cancer drug cause causes DNA fragmentation but little myelosuppression?

- A. Bleomycin
- B. Doxorubicin
- C. Daunorubicin
- D. Dactinomycin
- E. Mitomycin

24. What is the least likely method for resistance to methotrexate to develop?

- A. Decreased drug transport into cells
- B. Increased efflux of drug out of cells
- C. Mutation of DHFR with reduced drug affinity
- D. Gene amplification to produce more DHFR
- E. Evolution of a secondary folate synthesis pathway

25. What is true about hemorrhagic cystitis (as a drug limiting toxicity)?

- A. It is caused by a drug that spontaneously converts to an active metabolite in tissues and is alleviated by MESNA
- B. It is caused by a drug that is metabolized by P450 and is alleviated by Ondansetron
- C. It is caused by a DNA alkylation
- D. It is not caused by the drug itself, but by a toxic metabolite
- E. It is caused by acrolein, which is a metabolite of chlorambucil

26. Which DNA site is most prone to alkylation?

- A. N1-Thymidine
- B. N7-Guanine
- C. N7-Adenine
- D. N3-Guanine
- E. N3-Adenine

27. Which gene product is activated after extensive DNA alkylation?

- A. bcl-2
- B. ras
- C. p53
- D. myc

28. A cancer drug is known to intercalate between DNA base pairs and cause a very serious toxicity which Dexrazoxane might prevent. What is the mechanism of that serious toxicity?

- A. Free radical damage to the proximal tubules
- B. Free radical induced excess intracellular cardiac calcium
- C. Free radical induced skin toxicity
- D. Free radical damage to hepatocytes
- E. Free radical damage to oligodendrocytes

29. Which cancer drug is least myelosuppressive?

- A. Vinblastine
- B. Vincristine
- C. Melphalan
- D. Doxorubicin
- E. Cyclophosphamide

30. You have to pee wicked bad, but there are still 15 minutes left in lecture and you don't think you can make it. You notice four marked drug vials on the desk in front of you: Which drug would you be sure to NOT take? Your goal is to make it until the end of lecture without leaving or pissing your pants.

- A. phenylephrine
- B. terbutaline
- C. atropine
- D. bethanechol

31. You choose a drug that you think will give you a few extra minutes of bladder-hold time. After you take the pill, you realize with horror that the student next to you is doubled over with laughter. You can feel a warm wet spot forming at the seat of your pants. You've been tricked: all of the vials contained the same drug! What second messenger systems could have been activated in your detrusor muscle to cause you to wet yourself?

- A. Increased cAMP only
- B. Decreased cAMP only
- C. Decreased cAMP or Increased IP3/DAG
- D. Increased cAMP or Decreased IP3/DAG
- E. Increased IP3/DAG only
- F. Decreased IP3/DAG only

32. A patient comes into the emergency room complaining of heart palpitations. She is talking very quickly and says that she took a lot of speed an hour ago. Her pupils are fully dilated. Which drug would have no visible effect on her pupil diameter?

- A. phenylephrine
- B. prazosin
- C. bethanechol

33. You inject a rat with 100% norepinephrine. What adrenergic-antagonist would theoretically have the LEAST effect on blocking the physiological adrenergic response?

- A. prazosin
- B. yohimbine
- C. metoprolol
- D. butoxamine

Antifungal mix and match (more than once or not at all)

- A. Amphotericin B
- B. Clotrimazole
- C. Fluconazole
- D. Flucytosine
- E. Griseofulvin
- F. Itraconazole
- G. Ketoconazole
- H. Miconazole
- I. Nystatin
- J. Terbinafine
- K. Voriconazole

- 34. Inhibits thymidylate synthase
- 35. Inhibits 14- α demethylase. Excellent CNS penetration (therefore good to treat *Cryptococcal* meningitis)
- 36. Can cause GI symptoms and bone marrow depletion
- 37. Inhibits squalene epoxidase
- 38. Increases membrane permeability, can be used systemically
- 39. Potent P450 inhibitor
- 40. Oral absorption increased by eating high fat foods
- 41. P450 inducer
- 42. Nephrotoxic and hepatotoxic. Resistance to this drug does not develop.
- 43. Disrupts mitotic spindle
- 44. Activated by fungal cytosine deaminase to an “antineoplastic” drug
- 45. “swish and swallowed” for oropharyngeal candidiasis. Not given IV (too toxic), but would not inhibit P450.
- 46. Acts synergistically with another drug in the list that is a polyene macrolide

47. Why are mammalian cells resistant to triazoles and imidazoles?

- A. Because mammalian cells do not have a 30S ribosome
- B. Because mammalian cells use a different DNA gyrase than fungus
- C. Because mammalian cells do not have the necessary enzyme to convert the drug to its active form
- D. Because mammalian cells do not have steroids in their cell wall
- E. Because Cholesterol has fewer double bonds than Ergosterol

NNRTI's, Protease Inhibitors, and Other anti-retrovirals: Mix and Match

- A. Efavirenz
- B. Enfuvirtide
- C. Lopinavir
- D. Nevirapine
- E. Ritonavir
- F. Saquinavir

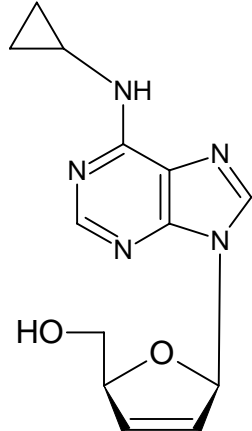
- 48. Currently the NNRTI of choice. Does not inhibit HIV-2 RT
- 49. Used by itself in the 3rd world to prevent viral transmission from mother to infant.
- 50. Resistance is conferred by the V82T mutation. Inhibits CYP3A and CYP2D6
- 51. Induces CYP3A
- 52. Often the first choice protease inhibitor. In the real world, it is often shipped with another protease inhibitor that also inhibits P450 metabolism.
- 53. Blocks HIV gp41 surface protein

54. What is not true about protease inhibitors?

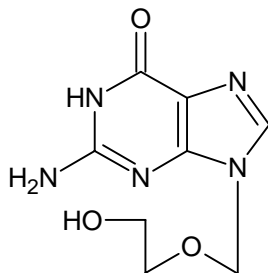
- A. They lock the HIV protease in a “flaps-open” conformation
- B. They are all “me-too” drugs where resistance to one = resistance to all
- C. They are always given in combination with other drugs
- D. They can present clinical challenges due to P450 inhibition
- E. They are not incorporated into the growing nucleotide chain

Structure Terror: #55-64

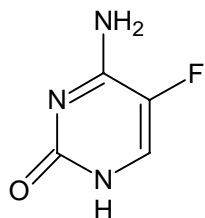
A.



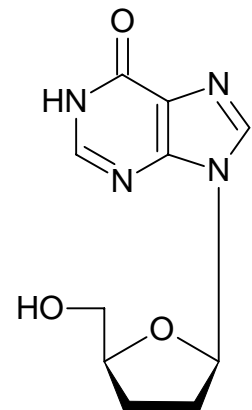
B.



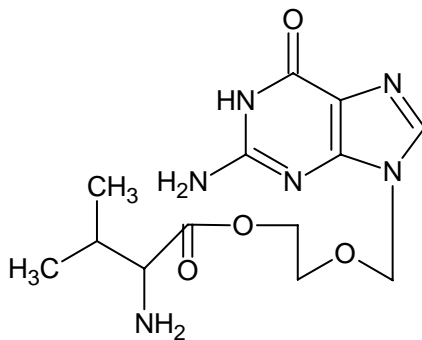
C.



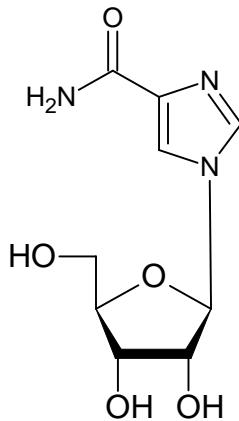
D.



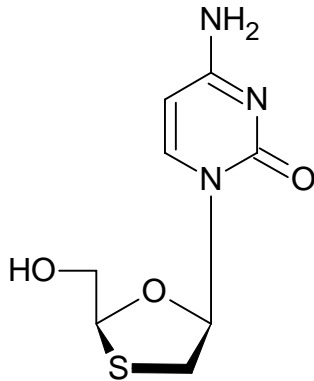
E.



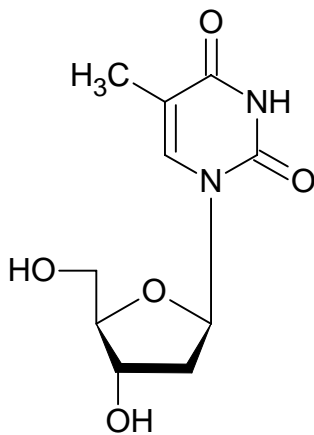
F.



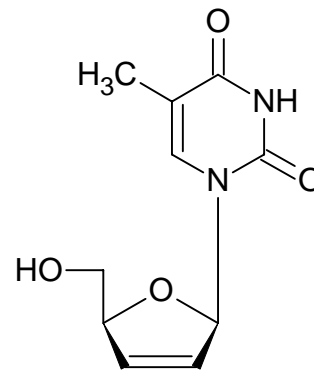
G.



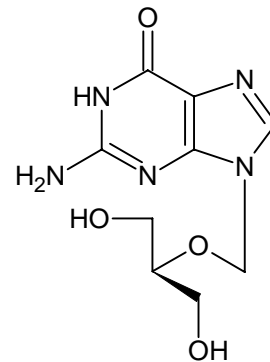
H.



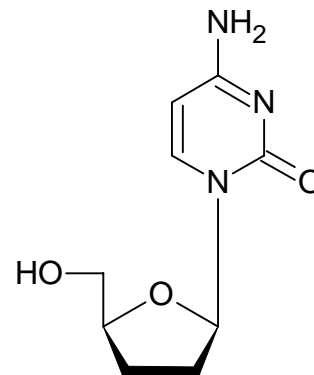
I.



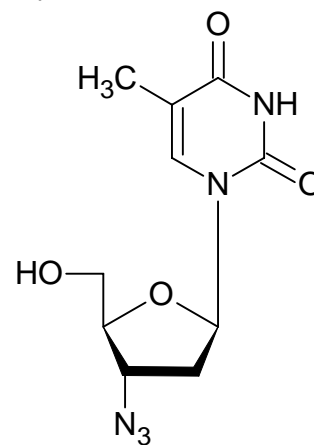
J.



K.



L.



- 55. Used clinically both against HIV and HBV
- 56. Viral thymidine kinase necessary to phosphorylate this drug. Chain terminator
- 57. L-Valyl prodrug ester of drug used against HSV
- 58. Effective against CMV
- 59. Typically given with Interferon
- 60. This is actually an antifungal drug, just to see if anyone was paying attention
- 61. Unlike nucleoside analogs that target HSV and CMV, this anti-HIV drug is phosphorylated by host enzymes. It is a chain terminator and one of its uses is as prophylaxis for accidental needle-sticks.
- 62. This drug takes advantage of the fact that the HIV reverse transcriptase is relatively error prone, so it doesn't notice when inosine attached to ribose
- 63. One of the most effective members of the NRTI class of drugs. Rare hypersensitivity can be fatal
- 64. An NRTI with dose-limiting peripheral neuropathy

Drugs that start with "A": mix and match

- A. Abacavir
 - B. Acyclovir
 - C. Adefovir dipivoxil
 - D. Amantidine
 - E. Amikacin
 - F. Amphotericin B
 - G. Azithromycin
 - H. *None of the Above*
- 65. Blocks influenza sialic acid trimming
 - 66. Binds to 50S ribosome
 - 67. An anti-HIV NRTI
 - 68. binds to 30S ribosome
 - 69. Blocks influenza uncoating
 - 70. A nucleotide analog
 - 71. Binds to influenza HA
 - 72. Binds to influenza M2
 - 73. This HBV drug can lead to a dramatic rise in HBV titer if discontinued. It's also nephrotoxic and can confer resistance to anti-retroviral drugs
 - 74. So, what about that antibiotic lecture?
 - A. It was more fun than wearing onychomycotic bowling shoes
 - B. It was about as much fun as watching clothes spin in the washing machine, and then being tested on what colors flew by when.
 - C. What antibiotic lecture?
 - D. Right.

PNS: mix and match

- A. atropine
- B. bethanechol
- C. butoxamine
- D. clonidine
- E. DMPP
- F. dobutamine
- G. dopamine
- H. hemicholinium
- I. isoproterenol
- J. metoprolol

- K. phenylephrine
- L. prazosin
- M. reserpine
- N. succinylcholine
- O. terbutaline
- P. trimethaphan
- Q. tubocurarine
- R. vesamicol
- S. yohimbine

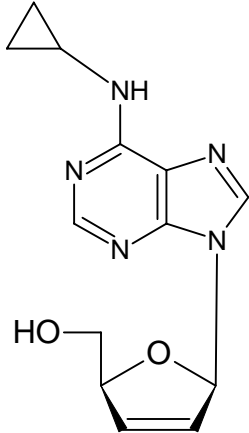
- 75. Inhibit contraction of radial muscle of eye (dilate pupil)
- 76. Stimulate bronchial smooth muscle relaxation
- 77. Stimulate sphincter muscle of eye (constrict pupil)
- 78. Stimulate contraction of urinary bladder trigone and sphincter muscles
- 79. Inhibit axillary sweat gland secretion
- 80. Stimulate contraction of urinary bladder detrusor
- 81. Inhibit decrease of insulin secretion in β cells
- 82. Stimulate uterine contraction
- 83. Inhibit relaxation of uterus
- 84. Inhibit ejaculation
- 85. Inhibit decrease in heart rate
- 86. Inhibit β -cell insulin secretion
- 87. Inhibit constriction of arterioles of abdominal visceral
- 88. Stimulate renin secretion
- 89. Inhibit glycogenolysis and gluconeogenesis in liver
- 90. Inhibit urinary bladder detrusor relaxation
- 91. Inhibit skeletal arteriole dilation
- 92. Inhibit bronchial smooth muscle relaxation

Answers:

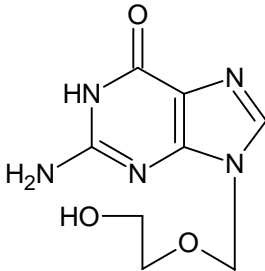
1. B
2. E
3. C
4. A
5. A
6. A & D
7. D
8. F
9. B
10. F
11. E
12. A
13. B
14. G
15. C
16. A
17. E
18. F
19. J
20. A
21. E
22. J
23. A
24. E
25. D
26. B
27. C
28. B
29. B
30. D
31. C
32. A
33. D
34. D
35. C
36. D
37. J
38. A
39. G
40. E
41. E
42. A
43. E
44. D
45. I
46. D
47. E
48. A
49. D
50. E
51. D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

Names:

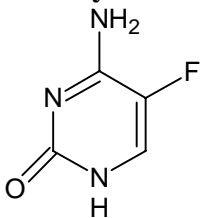
A. Abacavir



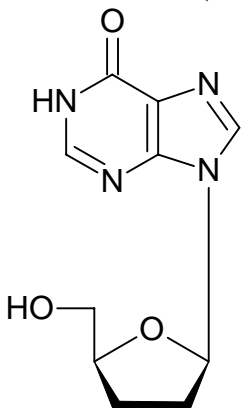
B. Acyclovir



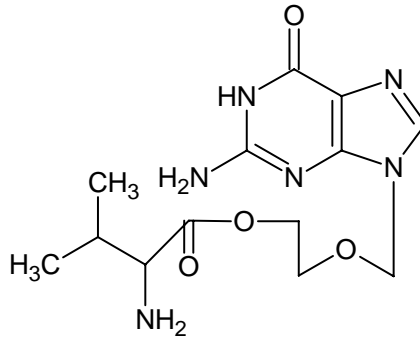
C. Flucytosine



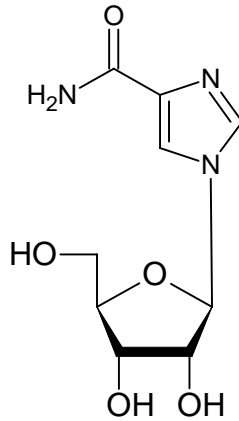
D. Didanosine (ddI)



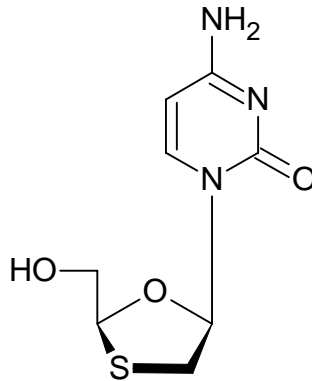
E. Valacyclovir



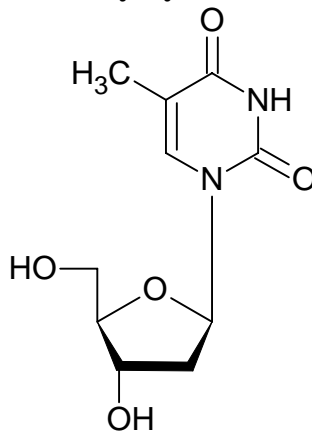
F. Ribavirin



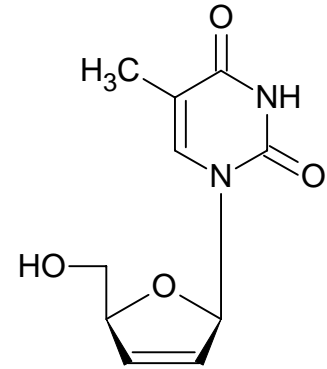
G. Lamivudine



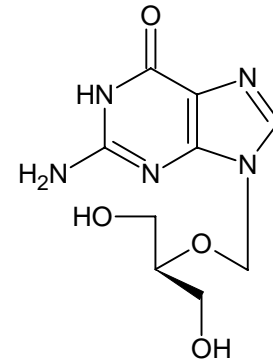
H. Deoxythymidine



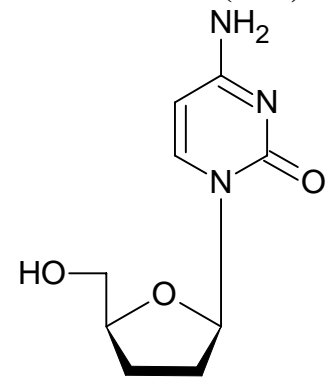
I. Stavudine (d4T)



J. Ganciclovir



K. Zalcitabine (ddC)



L. Zidovudine (AZT)

