

**MedCh 562 – Midterm 1: Drug Properties and Oncology - Key**

**Student name:** \_\_\_\_\_

**1. Oral administration of drugs is very convenient, but as discussed in class, use of a port for intravenous administration can be very useful as well. Which of the following are true?**

- A. Administration through a port avoids initial (first pass) metabolism by the liver.
- B. Administration through a port can help dilute a drug quickly.
- C. Administration through a port helps reduce CNS toxicities.

**D. A and B.**

E. B and C.

**2. Which of the following are true about clonal selection?**

- A. It is a primary cause of metastasis.
- B. It can lead to drug resistance.
- C. It arises because not all cancer cells are alike.

D. A and B.

**E. B and C.**

**3. Which are true of white blood cells (leucocytes)?**

- A. They include the neutrophils.
- B. They include the T-cells.
- C. They include the platelets.

**D. A and B.**

E. B and C.

**4. Which of the following are true about cytochrome P-450 enzymes?**

- A. They all contain a heme unit within the active site.
- B. They can be important for the metabolism of drugs but not steroid hormones.
- C. They are subject to inhibition and/or induction by certain drugs.

D. A and B.

**E. A and C.**

**5. Premedications are often given with chemotherapy drugs. As discussed in class, what is a major reason for giving patients premedications?**

- A. Prevention of allergic reactions.
- B. Prevention of nausea and vomiting.
- C. Prevention of metastasis.

**D. A and B.**

E. B and C.

**6. DNA and RNA are both very important to living cells. Which of the following are true?**

- A. DNA utilizes the bases adenine, guanine, cytosine and uracil.
- B. DNA can utilize both oxy- and deoxyribose.

**C. DNA is more chemically stable than RNA.**

D. A and B.

E. B and C.

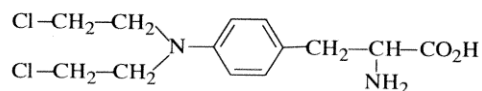
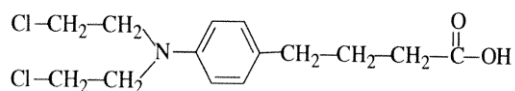
**7. Mutagenesis is believed to be the initiating event in carcinogenesis. Which of the following are true about mutations?**

- A. They are changes or mistakes in DNA.
- B. Once formed they cannot be repaired.
- C. The Philadelphia chromosome (bcr-abl) is an example of an oncogene mutation.

D. A and B.

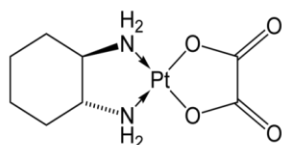
**E. A and C.**

8. The structures of Chlorambucil (left) and Melphalan (right) are shown below. What is true about these agents?



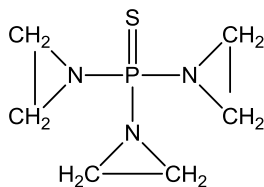
- A. They can both form aziridine ion intermediates that react with DNA.
- B. Melphalan can enter the brain better than Chlorambucil at pH 7.
- C. Neither can cause neutropenia.
- D. A and B.
- E. B and C.

9. Oxaliplatin is shown below. What is true about this agent?



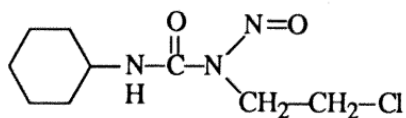
- A. Myelosuppression is not a concern.
- B. Peripheral neuropathy is a major concern.
- C. It is less lipophilic than cisplatin.
- D. A and B.
- E. B and C.

10. Thiotepa is shown below. Which of the following are true about this agent?



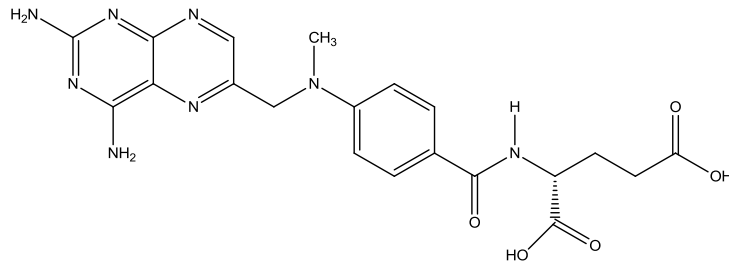
- A. It's a true prodrug.
- B. It will not enter the CNS.
- C. It can be used in bladder cancer by direct instillation into the bladder.
- D. A, B, and C.
- E. B and C.

11. Lomustine is an older anticancer agent and is shown below. What is true about this agent?



- A. It's an example of a nitrosourea drug.
- B. It's readily charged at physiological pH of 7.
- C. It's useful for glioblastoma (type of brain cancer) as the drug readily enters the CNS.
- D. A and B
- E. A and C.

12. Shown below is the structure of methotrexate (MTX). What is true about this agent?



- A. MTX is a mimic of folate (folic acid).
- B. MTX indirectly inhibits thymidylate synthetase.
- C. MTX prevents the formation of uracil.
- D. A and B.
- E. B and C.

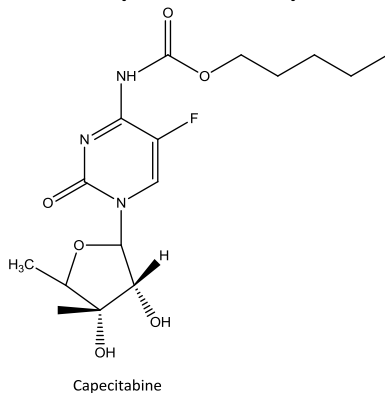
13. The FOLFOX regimen is useful for treating metastatic colorectal cancer. What is true about this regimen?

- A. It's a 3-component regimen of folinic acid, 5-fluorouracil and cisplatin.
- B. Myelosuppression is not a concern.
- C. Inhibition of thymidylate synthetase occurs with its use.
- D. A and B.
- E. B and C.

14. As discussed in class, Leucovorin is a useful agent in the setting of cancer. What is true about this agent?

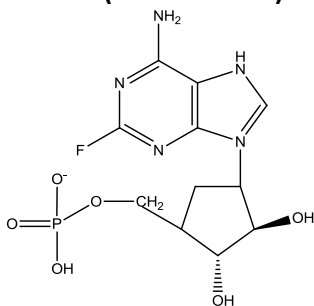
- A. It is useful to treat an overdose of methotrexate.
- B. It can be used to treat an overdose of 5-fluorouracil.
- C. It can be converted into methenyl tetrahydrofolate (methylene tetrahydrofolate) in vivo.
- D. A and B.
- E. A and C.

15. Capecitabine (shown below) is a very useful anticancer agent. What is true about capecitabine?



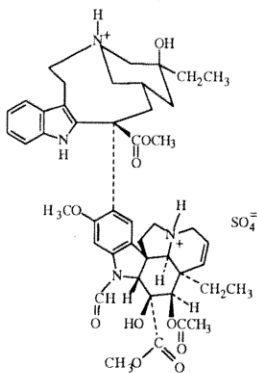
- A. It's a prodrug of 5-fluorouracil (5-FU).
- B. It must be administered IV like 5-FU.
- C. It can cause hand-foot syndrome.
- D. A and B.
- E. A and C.

16. Fludarabine (shown below) is a useful anticancer agent. What is true about this agent?



- A. It mimics adenosine, a natural base in DNA.
- B. It contains a natural ribose sugar.
- C. It can inhibit thymidylate synthetase.
- D. A and B.
- E. A and C.

17. Vincristine (Oncovin) is an older anticancer agent, but is still useful. What is true about it?

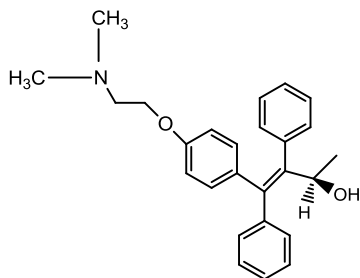


- A. It causes non-severe myelosuppression and therefore can be combined with other agents.
- B. Patients with a family history of CMT disease should be tested before use of this agent.
- C. Its mechanism of action involves binding to microtubules and interfering with mitosis.
- D. A, B, and C.
- E. A and B.

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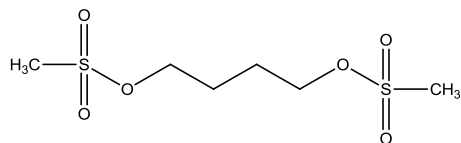
End of Scantron questions. Provide very short answers to the following directly on this exam paper.

18. Below is the structure of a hypothetical metabolite of tamoxifen. Provide very short answers to the questions below the structure.

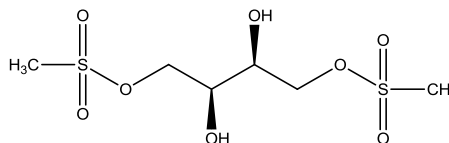


- A. Would this molecule possess a charge at physiological pH of 7.4? **Yes**
- B. If charged, would it be positive or negative? **Positive**
- C. The chiral center is easy to identify. Is the configuration R or S? **R**

19. Shown below are two anticancer drugs. Provide very short answers to the questions below the structures.



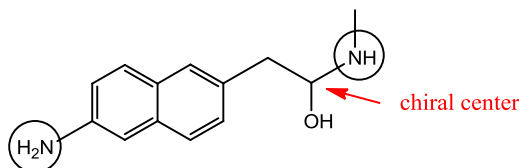
Busulfan



Treosulfan

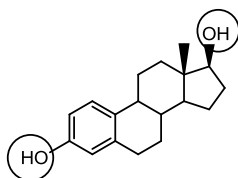
- A. Would you expect myelosuppression to be a side effect for both of these agents? **Yes**  
 B. Would you expect Treosulfan to enter the brain better than Busulfan? **No**  
 C. Can these agents react with DNA only once, or twice? **Twice**

20. Shown below is an analog of the drug propranolol. Provide very short answers to the questions below the structure.



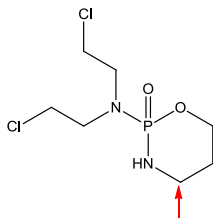
- A. Would this molecule possess any charge at stomach pH of 1-2? **Yes**  
 B. Circle any atoms that would be charged at pH 1-2. **See above.**  
 C. If there is a chiral center in this molecule, draw a small arrow at it. **See above.**

21. Shown below is the estrogen hormone "estradiol". Provide very short answers to the questions below.



- A. What is the configuration of the far right chiral center that bears the aliphatic hydroxy group? R or S?  
 B. Circle all atoms where a glucuronide conjugate can be formed for this molecule. **See above.**  
 C. Will a glucuronide conjugate be more or less polar than the parent molecule? **More polar.**

22. Shown below is the structure of cyclophosphamide which requires bioactivation. Provide very short answers to the questions below. **This was not a perfectly written question. I should have included the words "to the anticancer activity" to differentiate from the mechanism of toxicity.**



- A. Using a small arrow, point to the carbon that is first attacked by P-450 for bioactivation. **See above.**  
 B. What is the name of the reactive group formed by bioactivation? **Aziridine; also accepted "acrolein" because the question was not well written as stated above.**  
 C. Is pre-hydration important when using this agent? **Yes.**

23. Clinical trials are the best way we get convincing data about drug efficacy and drug safety. **True** or False?