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The short answer question answer was written on the page.

-1 point for circling the incorrect stereo center
(the correct one is identified in the printed answer)
Part II. Porubek

Oncology questions:

1. (2 pts) Chemotherapy is a major type of therapy for treating cancer patients. As discussed in class, the other major types of therapy for cancer patients are:
   A. Surgery
   B. Radiation
   C. Bone marrow or stem cell transplantation
   D. Only A and B
   [ ] A, B, and C

2. (2 pts) 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. Only A
   [ ] A and B

3. (2 pts) Drug resistance is an important issue in the treatment of cancer patients with chemotherapy. As discussed in class, drug resistance arises from:
   A. Metastasis
   B. Clonal selection
   C. Apoptosis
   D. A, B, and C

4. (2 pts) Among the different types of blood cells, the following are true about neutrophils:
   A. They are a subtype of white blood cells
   B. They help fight infection
   C. They assist with blood clotting
   D. They are the most abundant of all blood cells
   [ ] Both A and B
5. (2 pts) DNA utilizes the bases adenine, guanine, thymine and cytosine while RNA utilizes adenine, guanine, uracil and cytosine. True or False?

6. (2 pts) Busulfan is an old but useful alkylating agent that is presently used mostly for myeloablation prior to a bone marrow and stem cell transplants. True or False?

7. (4 pts) Below is the structure of an anticancer agent that has been evaluated in clinical trials. As discussed in class, circle the most important atom in this molecule. (Circle a single atom, not several atoms.)

As discussed in class, some predictable toxicities of this agent would include:

A. Myelosuppression  
B. Nephrotoxicity (kidney toxicity)  
C. Ototoxicity (hearing loss)  
D. Peripheral neuropathy (tingling or numbness in hands and feet)  
   0. A, B, C, and D

8. (6 pts) Ifosfamide (Ifex), an important anti-cancer drug, is shown below. As discussed in class, circle the most important molecules that form a reactive entity.

   ![](image)

If you circle one or both tubes with multiple extra chains (like the phosphorus) only 1 point

This drug is a prodrug, True or False?
As discussed in class, ifosfamide is converted into what active entity:

A. Diazonium ion
B. Aziridine ring
C. Nitrosourea
D. A and C
E. A, B, and C

Ifosfamide can cause several toxicities including:

A. Bladder toxicity
B. Nephrotoxicity (kidney toxicity)
C. Myelosuppression
D. A, B, and C

9. (6 pts) 5-Fluorouracil (5-FU) is an old but important oncology agent. It belongs to a large class of anticancer drugs called antimetabolites. As discussed in class, 5-FU directly inhibits this enzyme:

A. Dihydrofolate reductase (DHFR)
B. Thymidylate synthetase (TS)
C. Ribonucleotide reductase (RR)
D. Topoisomerase I (Topo I)

Polymorphic metabolism is an important aspect of the clearance of 5-FU. As discussed in class, what enzyme is important in this polymorphism?

A. Dihydrofolate reductase (DHFR)
B. Thymidylate synthetase (TS)
C. Ribonucleotide reductase (RR)
D. Dihydropyrimidine dehydrogenase (DPD)

As discussed in class, 5-FU is administered by the IV route only. A prodrug form of 5-FU exists that can be administered orally. This prodrug is called Civecetabine.
10. (6 pts) Methotrexate (MTX) is another important oncology agent that belongs to the antimitabolite class of drugs. What endogenous molecule does MTX mimic?

A. Uracil
B. Folate (or folic acid)
C. Vitamin B6
D. Ribose

As discussed in class, MTX directly inhibits this enzyme:

A. Dihydrofolate reductase
B. Thymidylate synthetase
C. Ribonucleotide reductase
D. Topoisomerase I

As discussed in class, what drug can be given to patients following an overdose (or intentionally high dose) of MTX? Leucovorin

11. (10 pts) Irinotecan is an important oncology agent that belongs to the general class of agents called Topoisomerase I inhibitors.

Topoisomerase I enzymes are important in DNA replication because they relieve torsional strain involved in the unwinding of DNA. True or False?

As discussed in class, irinotecan is converted into this active metabolite: SN-38

Irinotecan is used primarily for treating colorectal cancer and is used in a combination regimen called FOLFIRI. As discussed in class, name the three agents in this combination regimen by filling in the blanks below:

FOL: Folinic acid or folate
F: 5-FU or 5-fluorouracil
IRI: Irinotecan

Polymorphic metabolism is an important aspect of the metabolism of irinotecan. As discussed in class, what enzyme is involved in this polymorphism?

A. Thiopurine methyltransferase (TPMT)
B. Thymidylate synthetase (TS)
C. Uridine glucuronosyltransferase (UGT1A1)
D. Dihydropyrimidine dehydrogenase (DPD)
12. (6 pts) Doxorubicin (Adriamycin) is an important oncology agent that belongs to the Topoisomerase II class.

As discussed in class, this agent has more than one mechanism of action. These mechanisms include the following:

A. Intercalation into DNA  
B. Inhibition of thymidine formation  
C. Formation of reactive oxygen species  
D. A and B  
E. A and C

IV administration of this agent can be a problem if the agent enters the tissue around the venous administration site. What is this problem called? *Extravasation*

Use of this drug is also associated with an unusual toxicity to a specific organ. Name this organ or toxicity: *Cardiotoxicity or heart toxicity*