

**Midterm 2: 3 points each (except final question worth 1 point)**

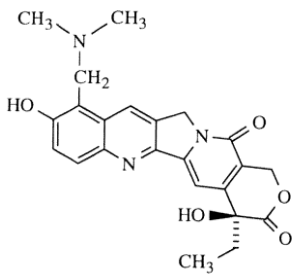
1. A useful regimen for treating colorectal cancer is FOLFIRI. What is true about this regimen?

- A. The regimen includes folinic acid, 5-fluorouracil (5-FU), and irinotecan.
- B. The regimen will likely cause peripheral neuropathy.
- C. The regimen will likely cause myelosuppression.
- D. A and B
- E. A and C

2. Irinotecan (shown below) is a prodrug and is converted to the active metabolite SN-38. What is also true about irinotecan?

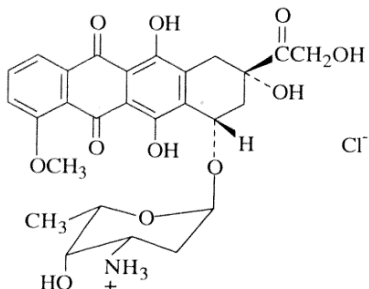
- A. It is a topoisomerase I inhibitor.
- B. Diarrhea can be a major side effect.
- C. Ototoxicity (hearing loss) can be a major side effect.
- D. A and B
- E. B and C

3. Shown below is topotecan. What is true about this agent?



- A. It is formulated as a salt to increase its solubility.
- B. It is extensively metabolized to a glucuronide metabolite.
- C. It interferes with the action of the mitotic spindle.
- D. A and B
- E. B and C

4. Shown below is the structure of doxorubicin (Adriamycin). What is true about this agent?

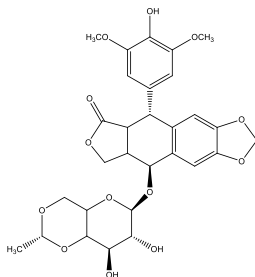


- A. It is a topoisomerase II (Topo II) inhibitor.
- B. Its use is limited by the total amount of drug that can be given to each patient.
- C. It can cause myelosuppression.
- D. It can cause cardiotoxicity.
- E. All of the above.

5. Dactinomycin and mitomycin are two macrolide antibiotics and their mechanism of action involves:
- Inhibition of microtubules.
  - Intercalation into DNA.
  - Formation of reactive oxygen species (ROS).
  - A and B
  - B and C

6. Lenolidamide (Revlimid) is an immunomodulator type of anti-cancer drug. Which of the following are true about this drug?
- It can inhibit angiogenesis.
  - It can be assumed to be teratogenic (cause birth defects).
  - It can cause severe myelosuppression.
  - A and B
  - B and C

7. Etoposide is an older but useful anti-cancer agent and the structure is below.



- It interferes with the mitotic spindle (the microtubules).
- It intercalates into DNA.
- It causes cardiotoxicity due to formation of reactive oxygen species (ROS).
- A and B
- B and C

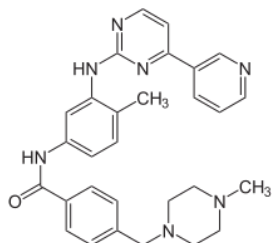
8. Abraxane (nab-paclitaxel) is a newer formulation of paclitaxel. As discussed in class, which of the following is true about this agent?
- It is formulated by pre-binding the paclitaxel to serum albumin.
  - It causes fewer (or less severe) infusion reactions compared to the Taxol formulation of paclitaxel.
  - It would not be expected to cause myelosuppression.
  - A and B.
  - A and C.

9. The package insert for halichondrin (Eribulin) states its use for treating breast cancer in patients who have previously received at least two chemotherapeutic regimens for the treatment of metastatic disease. A patient's prior therapy should have included an anthracycline and a taxane in either the adjuvant or metastatic setting. What is true for this agent?
- It can be used as first or second line for breast cancer.
  - It disrupts the action of the mitotic spindle (microtubules).
  - It can be used after surgical removal of the tumor in breast cancer.
  - A and B
  - B and C

10. The agent trastuzumab emtansine (Kadcyla) is useful for treating breast cancer. As discussed in class, which of the following is true about this agent?

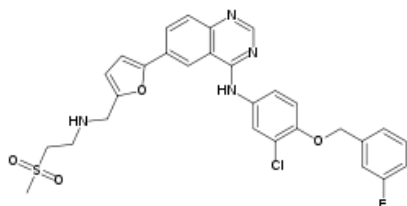
- A. It targets HER2 on certain breast cancer cells.
- B. It's a fully humanized antibody and will not cause infusion reactions.
- C. Unlike trastuzumab, this agent will not cause cardiotoxicity.
- D. A and B.
- E. A and C.

11. The drug imatinib (Gleevec) is shown below. What is true about this agent?



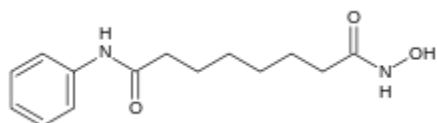
- A. It's a proteasome inhibitor.
- B. Resistance to it can develop rather quickly due to the T315-I mutation.
- C. It must be administered IV.
- D. A and B
- E. B and C

12. The drug lapatinib (Tykerb) is shown below and is a useful agent in the treatment of breast cancer. What is true about this agent?



- A. It must be formulated in Cremophor/ethanol to improve its solubility.
- B. It inhibits a kinase within cells that possess the HER2+ cancer cells.
- C. It is not expected to cause any QT prolongation.
- D. A and B
- E. B and C

13. Vorinostat is an anti-cancer agent and is shown below. It is administered orally with food. What is true about this agent?



- A. It's a histone deacetylase (HDAC) inhibitor.
- B. Variability in exposure (C<sub>max</sub> and AUC) is lower when administered with food.
- C. It is highly glucuronidated.
- D. A and B
- E. A, B, and C

**14.** Enzalutamide is a relatively new anti-androgen drug (approved in 2012) that is useful for treating prostate cancer. It's mechanism of action involves:

- A. Inhibition of androgen binding to the androgen receptor (AR).
- B. Inhibition of androgen biosynthesis.
- C. Degradation of the AR.
- D. A and B
- E. A and C

**15.** Letrozole (Femara) is an antiestrogen drug useful in the treatment of breast cancer. Which of the following are true about this drug?

- A. It is useful for estrogen receptor negative (ER-) cancers.
- B. It inhibits CYP19A1.
- C. It inhibits CYP17A1.
- D. A and B
- E. A and C

**16.** Prednisone, prednisolone and dexamethasone are all glucocorticoid drugs. What is true about these agents:

- A. Dexamethasone is the most potent.
- B. They can directly kill cancer cells.
- C. They often cause nausea.
- D. A and B
- E. B and C

**17.** Some drugs cause QT prolongation which can lead to heart arrhythmia (also called Torsade de Pointes). Which of the following are true of QT prolongation:

- A. Antiestrogen type drugs never cause QT prolongation.
- B. Women are a little more susceptible to QT prolongation than men.
- C. QT prolongation can lead to fatal heart arrhythmia.
- D. A and B
- E. B and C

**18.** Tamoxifen is an old antiestrogen drug that is useful for breast cancer. Which of the following are true about tamoxifen?

- A. It is useful for ER+ breast cancer.
- B. It is subject to polymorphic metabolism by CYP2D6.
- C. It is converted into an active metabolite called endoxifen.
- D. A and C
- E. A, B, and C

**19.** Idelalisib (Zydelig) is a newer anticancer drug. The following are true about this agent:

- A. It's a tyrosine kinase inhibitor.
- B. It is cytotoxic.
- C. Binds in the same pocket as ATP or GTP.
- D. A and C
- E. B and C

**20.** Bortezomib is useful for multiple myeloma. What is true about this agent?

- A. It's an mTOR inhibitor.
- B. It's a proteasome inhibitor.
- C. It's a tyrosine kinase inhibitor.
- D. A and C
- E. None of the above

**21.** Pembrolizumab (Keytruda) was recently approved for treating metastatic melanoma. Which of the following are true about this agent?

- A. It targets the PD-1 receptor.
- B. It enhances (or de-cloaks) the immune response of T cells.
- C. Severe immune reactions can occur because it enhances the immune system.
- D. All of the above
- E. None of the above

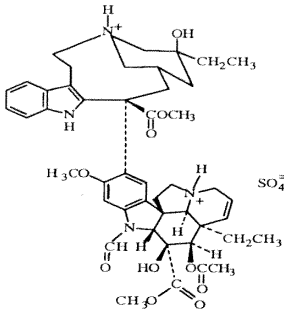
**22.** Brentuximab vedotin (Adcetris) is an antibody conjugate. Which of the following are true about the agent?

- A. It targets the CD20 cell surface protein.
- B. It is conjugated to a radioisotope.
- C. It can cause progressive multifocal leucoencephalopathy (PML).
- D. All of the above
- E. None of the above

**23.** Cabazitaxel (Jevtana) is the most recently approved taxane type drug. Which of the following are true about this agent?

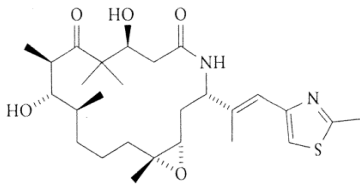
- A. It targets the microtubules.
- B. It inhibits mitosis.
- C. It typically causes myelosuppression but not peripheral neuropathy.
- D. A and B
- E. A, B, and C

**24.** Vincristin (Oncovin) is a vinca alkaloid and is shown below. Which of the following are true about this agent?



- A. It targets the microtubules.
- B. It is difficult to dissolve and must be formulated in Cremophor and ethanol.
- C. It causes severe myelosuppression.
- D. A and B
- E. A and C

**25.** The molecule below is Ixabepilone (Ixempra). Which of the following are true of this agent?



- A. It intercalates into DNA.
- B. It binds to microtubules.
- C. It can cause myelosuppression, peripheral neuropathy, and immune/allergic reactions.
- D. A and B
- E. B and C

**26.** BCG (Bacillus Calmette Guerin; also called TheraCys) is an unusual agent for treating cancer. Which of the following are true for this agent?

- A. It's a live, but attenuated form of a TB bacterium.
- B. It is used for early, superficial bladder cancer.
- C. It is administered IV to patients.
- D. A and B
- E. A and C

**27.** Gardasil-9 is a true vaccine. Which of the following are true for this vaccine?

- A. It is useful for girls but not boys.
- B. It targets 9 HPV viruses (7 for cancer and 2 for genital warts).
- C. Data indicate it can cause GBS (Guillen Barre syndrome).
- D. It does not prevent oral or pharyngeal cancers.
- E. None of the above

- 28.** G-CSF (Neupogen) is a cell stimulatory agent. Which of the following are true about G-CSF?
- A. It stimulates production of all leukocytes including neutrophils.
  - B. It preferentially stimulates neutrophils.
  - C. It can help stimulate the production of platelets.
  - D. It is useful for chemotherapy induced anemia.
  - E. None of the above
- 29.** Epoetin (Procrit) is a type of supportive agent. Which of the following are true for this agent?
- A. It stimulates platelets.
  - B. Its use in cancer is associated with an increased risk of myocardial infarction and stroke.
  - C. It can be used for any type of cancer.
  - D. All of the above
  - E. None of the above
- 30.** Zolendronate is a bisphosphonate type of drug. Which of the following are true for this agent?
- A. It mimics the endogenous molecule ATP in the body.
  - B. It is useful to reduce skeletal events (fractures) associated with several forms of cancer.
  - C. It can cause (ONJ) osteonecrosis of the jaw.
  - D. A, B, and C
  - E. B and C
- 31.** Ondansetron, granisetron, and polonsetron are all anti-emetic agents. Which of the following are true for these agents?
- A. They all are antagonists of the serotonin receptor (5-HT receptor).
  - B. They are useful for nausea caused by chemotherapy but not radiation.
  - C. They must all be administered IV.
  - D. All of the above
  - E. None of the above
- 32.** Dexrazoxane is a supportive agent. Which of the following are true for this agent?
- A. It can be used as a cardioprotectant when drugs such as anthracyclines are administered.
  - B. It is useful to protect against ototoxicity (hearing loss) from platinum agents.
  - C. It is useful to protect against extravasation injury.
  - D. A and B
  - E. A and C
- 33.** This supportive agent is polar and is specifically used to protect against bladder cancer caused by agents such as ifosfamide or cyclophosphamide.
- A. Amifostine (Ethyol)
  - B. Mercaptoethyl sulfonate (MesNa)
  - C. N-acetylcysteine (NAC)
  - D. Glucarpidase (Voraxaze)
  - E. None of the above
- 34.** Package inserts are the ultimate source of information for the legal and ethical use of anti-cancer agents.
- A. True
  - B. False