Why Do Drugs Affect People Differently?
Understanding Factors That Influence Drug Responses

Posttest and Rationale

1. Which of the following statements is correct concerning pharmacodynamics?
   A. Pharmacodynamics is concerned with what a drug does to the body
   B. Pharmacodynamics is concerned with what the body does to a drug
   C. Pharmacodynamic drug interactions can only be antagonistic
   D. All of the above are correct

Correct answer: A
Pharmacodynamics, *what a drug does to the body*, and pharmacokinetics, *what the body does to a drug*, are both affected by food. Pharmacodynamic food-drug interactions occur when foods act at the same or interrelated receptor sites as a drug, resulting in additive, synergistic, or antagonistic effects at the desired biological target.

2. The biological effect that results from sporadic sodium intake and lithium is an example of which of the following drug interactions?
   A. Pharmacodynamic
   B. Pharmacokinetic
   C. Complexation
   D. None of the above

Correct answer: B
Pharmacokinetics (PK) is concerned with what the body does to a drug. The lithium-sodium interaction is a PK interaction because the body either eliminates or retains lithium, depending on multiple factors.

3. Of the recommended 1000 calorie test meals used in food-effect studies, how many calories are should be derived from fat?
   A. 100-150
   B. 200-250
   C. 500-600
   D. 800-850

Correct answer: C
To assess the impact of food on orally-administered drug products during clinical development, guidance from the US Food and Drug Administration (FDA) recommends that test meals include 150, 250, and 500-600 calories from protein, carbohydrate, and fat, respectively.

4. Grapefruit juice affects the metabolism of numerous oral medications by inhibiting CYP3A4 enzymes in the:
   A. Liver
   B. Gastrointestinal tract
   C. Kidney
   D. None of the above

Correct answer: B
Research suggests the oral route of administration is the only route affected by GFJ, considering medications that bypass CYP3A4 enzymes in the GI tract (e.g., medications given intravenously) are usually spared. Further, the GFJ-CYP3A4 interaction occurs through the following mechanism: GFJ binds
to and inhibits the ability of intestinal CYP3A4 enzymes to metabolize or breakdown medications, resulting in prolonged BA.

5. **Narrow therapeutic index drugs are those where:**
   A. There is less than a 2-fold difference between the median lethal and median effective dose
   B. There is less than a 2-fold difference between the minimum toxic and minimum effective concentrations in the blood
   C. The safe and effective use of the drug requires careful titration and patient monitoring.
   D. All of the above***
   **Correct answer: D**

   **NTI drugs** → (1) there is less than a 2-fold difference between the median lethal and median effective dose; or (2) there is less than a 2-fold difference between the minimum toxic and minimum effective concentrations in the blood; and (3) safe and effective use of the drug requires careful titration and patient monitoring.

6. **When kidney function is impaired, it is expected that:**
   A. Gentamicin elimination will increase
   B. Gentamicin elimination will decrease***
   C. Gentamicin elimination will not change
   D. None of the above
   **Correct answer: B**

   Although declining kidney function is not an absolute contraindication to aminoglycoside therapy, a reduced dosage or an expanded dosing interval must be recommended in these circumstances to avoid accumulation of excessive amounts of drug in the body.

7. **When a patient is stabilized on a dose of warfarin and a potent inducer of the enzyme CYP2C9 is added to his or her regimen, the dose of warfarin will likely need to be:**
   A. Increased***
   B. Decreased
   C. No change in dose will be needed
   D. None of the above
   **Correct answer: A**

   Rifampin up-regulates the liver enzyme CYP2C9, which allows this enzyme to be more effective. Warfarin is metabolized by CYP2C9. When a patient who is currently taking warfarin begins treatment with rifampin, the desired blood thinning effects of warfarin are reduced substantially because of the accelerated metabolic activity of CYP2C9 that is caused by rifampin. As a result, the dose of warfarin must be increased significantly.

8. **When 2 drugs with similar mechanisms of action produce an effect equal to the sum of the individual effects, the interaction is referred to as:**
   A. Potentiating
   B. Anecdotal
   C. Synergistic
   D. Additive***
   **Correct answer: D**
Additive interactions occur when 2 drugs with similar mechanisms of action produce an overall effect that is equal to the sum of the individual drug effects.

9. When a patient takes too much alprazolam and it becomes an emergent situation, the patient is likely to be administered flumazenil to reverse alprazolam’s effects. In this sense, flumazenil is considered which of the following?
   A. A substrate
   B. An inhibitor
   C. An antidote***
   D. An inducer

Correct answer: C
An antidote is a drug or substance that reverses the effect of another drug.

10. Differences in which of the following are among significant factors that influence patients’ responses to medications?
   A. Age
   B. Gender
   C. Genetics
   D. All of the above***

Correct answer: D
In select studies involving tamoxifen, patients with modified CYP2D6 have demonstrated an increased number of relapses and poorer quality of life compared to patients without its modified enzymatic form. In addition, female gender and advanced age have been identified as risk factors for the long-term use of zolpidem and other sleep-related medications. The takeaway message is that individuals’ clinical responses to drugs are influenced by several factors, including age, gender, and genetics.