

## Pharmacokinetics Class Preparation

### Nursing 101

GI SYSTEM: The oral medication reaches the systemic circulation through the GI system. As a result, numerous factors can affect the absorption of the pill.

Questions:

1. **A client is experiencing diarrhea. How could this effect absorption of an oral drug?**

If a patient has diarrhea, their body system is not absorbing the proper amount of water and moves out of the body quickly. This would affect absorption of an oral drug as it would also move through the body too quickly for proper absorption.

2. **How could the presence of food in the stomach affect the rate of absorption?**

Having the presence of food in the stomach or intestines impacts the absorption pattern. With food being present, the absorption rate may be reduced as the body is simultaneously metabolizing food as well as medication.

CARDIOVASCULAR SYSTEM: Once the pill is absorbed into the bloodstream, it is carried or delivered to the sites of pharmacologic action where the drug produces its effects.

Question:

3. **How do you think the distribution of the oral medication affected if a client has less than normal cardiac output?** I would think that with a less than normal cardiac output that the drug would not always reach the appropriate site with the appropriate amount to produce the desired effect. Because of this, the drug may appear as though it is ineffective or that the dosage is not high enough.

LIVER: Most biotransformation takes place in the liver. Any decrease in the ability of the liver to metabolize medication could lead to an accumulation of the active drug in the bloodstream. This could put the client at risk for toxic effects and adverse reactions.

Questions:

4. **How might nutritional status affect metabolism?** Supplying the body with proper nutrients will increase metabolism as the body will not have to pull from reserves, which would slow the process. If an individual is malnourished, this would slow medication metabolism as they are not able to produce specific medication metabolizing enzymes as efficiently.
5. **What factors influence the rate of medication metabolism?** Age influences the rate of medication metabolism. Infants have a limited medication metabolism, while hepatic medication metabolism tends to decline with age, therefore older adults require smaller dosages. Increase in some medication-metabolizing enzymes can lead to a faster metabolism of certain medications. First-pass effect is when the liver inactivates some medications on their first pass through the liver. This would

eliminate medication metabolism or drastically minimize the amount of medication within the body. Similar metabolic pathways can alter the metabolism of one or both of the medications which would leave to medication accumulation. The last factor is nutritional status where a malnourished client would have a decreased medication metabolism as it takes longer for their medication-metabolizing enzymes to be produced.

**KIDNEYS:** Drug excretion/elimination occurs mainly through the kidneys into the urine. If there is any impairment in kidney function, medications may not be excreted at the anticipated speed. Subsequent medication administration may lead to accumulation and potential toxicity.

Questions:

6. **Why would very young and very old clients need to be closely monitored by nurse for signs and symptoms of drug toxicity?** Very young and very old clients have a decreased rate for metabolism of medication. Because of this decreased metabolism, there is a greater chance that the drug is not properly and thoroughly absorbed and ends up as a waste product in the kidneys. With an excessive buildup of the drugs as waste products in the kidneys, there is an increased risk for drug toxicity.
7. **How can the nurse assess kidney function?** Kidney function can be assessed by monitoring blood urea nitrogen (BUN) and creatine levels.