MECHANISMS AND TYPES OF DRUG-DRUG AND DRUG-FOOD INTERACTIONS RELEVANT TO DENTISTRY

Learning Outcomes

By the end of this lecture, students should be able to:

Describe drug-drug and drug-food interactions
Explain Factors Influencing Drug Interactions
Discuss drug interactions and food interactions with different drugs in the course

Two Types

- Drug-Drug Interactions
- Drug-Food Interactions

DRUG-DRUG INTERACTIONS

Introduction

- The more medications, the greater the chance for the drug interacting with another medicine.

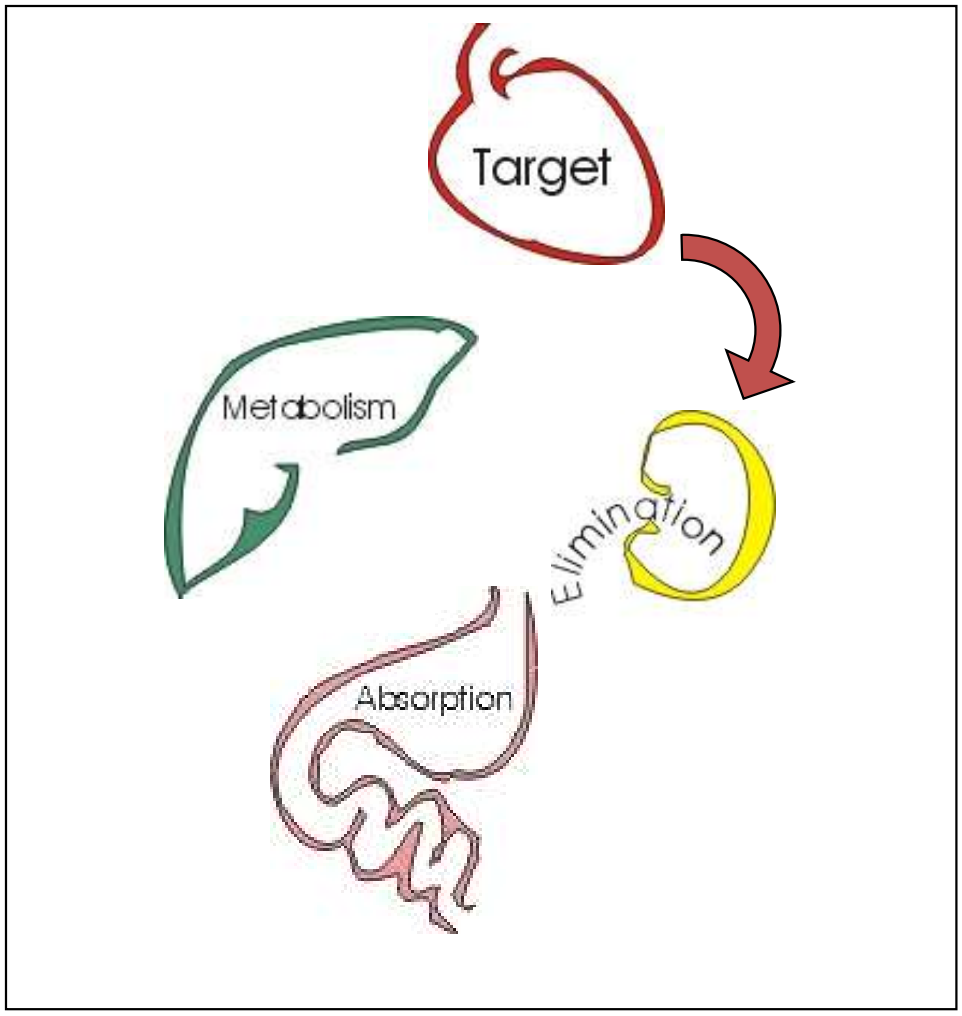
- Drug-drug interactions can decrease how well medications work, may increase minor or serious unexpected side effects, or even increase the blood level and possible toxicity of a certain drug.

- For example, if a pain medication, like **Hydrocodone** and a sedating **antihistamine**, such as **diphenhydramine**, at the same time there will be an additive amount of drowsiness as both medications cause this side effect.
- Still a preventable cause of morbidity.

Objectives for improving awareness of drug interactions

A. Evaluate medications
B. Famous interactions
C. Group medications
D. Hear your patient

Consider the Medication's passage through the body



Absorption

Change in gastrointestinal motility

- Tetracyclines or fluoroquinolones chelate with calcium, iron, antacids, and dairy products → reducing absorption.

Distribution

- Distribution: Drugs competing for plasma protein binding.
- **Example:** NSAIDs displacing warfarin from albumin → ↑ bleeding risk.

Metabolic Interactions

- Inhibition or induction of hepatic enzymes (CYP450).Example: **Metronidazole** inhibits warfarin metabolism → excessive anticoagulation, bleeding risk.
- **Rifampicin** induces metabolism of many drugs → reduced efficacy of antifungals, corticosteroids

Elimination

- Certain medications can compete for excretion
- Altered renal clearance.

Example: NSAIDs reduce renal prostaglandin synthesis → ↓ renal clearance of methotrexate → toxicity

Pharmacodynamics Interactions (Target Site Interactions)

- Occur at the **site of action** or via physiological systems.

A. Additive or Synergistic Effects

- **CNS depressants (opioids + benzodiazepines or alcohol) → enhanced sedation, respiratory depression**.
- **NSAIDs + corticosteroids → ↑ risk of GI ulcer/bleeding**.

B. Antagonistic Effects

- **NSAIDs antagonize antihypertensives (β-blockers, ACE inhibitors, diuretics)** → poor blood pressure control.

FOOD AND DRUG INTERACTION

Therapeutic Importance

Therapeutically important interactions are those that:

- Alter the intended response to the medication
- Cause drug toxicity
- Alter normal nutritional status

Patients at Risk for Food-Nutrient Interactions

- Patient with chronic disease
- Elderly
- Fetus
- Infant
- Pregnant woman
- Malnourished patient
- Allergies or intolerances

Food/Nutrient Effects on Drugs

- **Ciprofloxacin and Tetracycline** form insoluble complexes with calcium in dairy products or fortified foods; also zinc, calcium, magnesium, zinc or iron supplements; aluminum in antacids.
- Stop unnecessary supplements during drug therapy or give drug **2 hours before or 6 hours** after the mineral.
- Bioavailability **of Ceftin, an antibiotic**, is 52% after a meal vs 37% in the fasting state

SOME MORE EXAMPLES

Precipitant drug	Object drug	Likely interaction and comments
Ampicillin	• Contraceptives • Oral anticoagulants.	• Failure of contraception; Advise alternative contraception • Risk of bleeding
Metronidazole Tinidazole	• Lithium salts • Warfarin	• Decreased excretion of lithium • Risk of bleeding
NSAIDs	• Ciprofloxacin	• Enhanced CNS toxicity, seizures.
Propranolol	• Adrenaline (injected with local anesthetic)	• Rise in BP

References

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Thank you