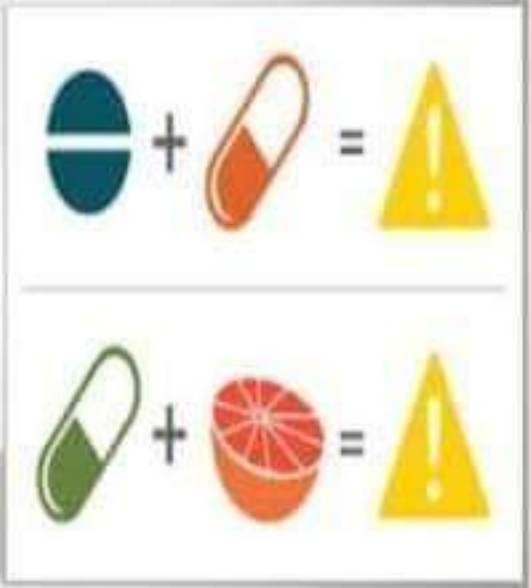

Fb@DrugSBank
Important
Drug
Interactions

Drug Interaction

A drug interaction is a situation in which a substance **(usually another drug)** affects the activity of a drug when both are administered together.

Interactions may also exist between drugs and foods **(drug-food interactions)**, as well as drugs and medicinal plants or herbs **(drug-plant interactions)**.



DRUGS

Types of Drug Interactions

Pharmacodynamic

Modulate
a drug's effect at a given
plasma concentration

Pharmacokinetic

Alter
the blood concentration
of a given drug

Types of Drug Interactions

- Drug-drug
- Drug-disease
- Drug-herbal
- Drug-alcohol
- Drug-food
- Drug-nutritional status
- Drug-lab

Drug-Drug interactions

- Drug-drug interactions occur when a drug interacts, or interferes, with another drug. This can alter the way one or both of the drugs act in the body, or cause unexpected side effects.

1. Aspirin+ Warfarin Synergism (excessive bleeding)
2. Antibiotic+ Blood thinner Antagonism (less effect)
3. Decongestants+ Antihypertensive Potentation (high blood pressure)
4. Codeine+ Paracetamol Addition (increased analgesic effect)
5. Clavulanic acid+ Amoxicillin Synergism (increased antibiotic effect)
6. NSAID+ Cox 2 inhibitors Synergism (increased bleeding)
7. SSRI'S+ Vitamin K Synergism (increased bleeding)
8. Ant emetics+ Tranquilizers Unknown effect (breathing problems)
9. H2 blockers+ PPI'S Alteration (increase ph of stomach)
10. Phenobarbital + Warfarin Antagonism (less effect)
11. Erythromycin + Warfarin Synergism (increased bleeding)

Drug-Disease interactions

1. Drug-condition interactions occur when a drug worsens or exacerbates an existing medical condition

2. Nasal decongestants+ Hypertension	Increased blood pressure
3. NSAID'S+ Asthmatic patients	Air way obstruction
4. Minoxidil+ Heart failure	Fluid rentation
5. Calcium channel blocker + Heart failure	Negative inotropic activity
6. Nicotine + high blood pressure	Increased heart rate
7. Beta blockers+ Heart failure	Worsen asthma
8. Metformin + Heart failure	Increased lactate level

Drug-Disease interactions

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Drug-Nutrient Interactions: Food Intake

- Examples:
  - Appetite suppressants are medications which affect food intake by depressing appetite
  - Several cancer medications and treatments may dramatically reduce food intake by causing:
    - Loss of appetite
    - Changes in taste perception
    - Nausea, vomiting
    - Dry mouth
    - Mouth and intestinal sores or inflammation

EXTENSION

Effects of Interactions

Nutrient depletion

- Individual nutrients may have their dietary requirement increased by specific drugs (or supplements).

Adverse

- A specific supplement may undesirably decrease or increase the effect of a drug or supplement being taken.

Beneficial

- Drugs (or supplements) may have their actions enhanced or side effects diminished by specific supplements.

Drug	Food/herb	Effect
Tetracyclines Fluoroquinolones	Calcium, magnesium	Increased absorption of drugs
Tetracyclines	St. John's wort	Increased photosensitivity
Fluoxetine	St. John's wort	CNS depression increased
Antihistamine	Alcohol	CNS depression increased
	St. John's wort	Serotonin syndrome Photosensitivity increased
Cyclosporine	St. John's wort	Less immunosuppression Increased photosensitivity
Prednisolone	Aloe vera	Loss of potassium
Psoralen	Dong quai	Increased photosensitivity
Antipsychotics	Evening primrose oil	Risk of seizures

Drug Interaction Definition

- A clinically meaningful alteration in the effect of one drug as a result of coadministration of another
- Drug affected by interaction is called the “object drug”
- Drug causing interaction is called the “precipitant drug”
- Interactions may be desirable or undesirable

Table

Prescriber Response to Potential Drug Interaction Pairs

Object Drug	Precipitant Drug	Did Not Know of Interaction (%)
Alprazolam	Itraconazole	56
Cisapride	Erythromycin	30
Cyclosporine	Rifampin	58
Digoxin	Amiodarone	35
Digoxin	Clarithromycin	35
Lovastatin	Gemfibrozil	26
Methotrexate	Cotrimoxazole	53
Sertraline	Phenelzine	47
Sildenafil	Isosorbide	29 (study 1)
Sildenafil	Isosorbide	16 (study 2)
Theophylline	Cimetidine	26
Warfarin	Cimetidine	18
Warfarin	Cotrimoxazole	32

Adapted from references 1 and 2.

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DRUG INTERACTIONS

NSAIDS	Ibuprofen Naproxen Diclofenac	Alcohol increases the risk of gastrointestinal bleeding
SEDATIVES AND HYPNOTICS	Chloral hydrate Meprobamate	Alcohol inhibits the metabolism and enhances the sedation, drowsiness
TRICYCLIC ANTIDEPRESSANTS	Amitryptaline Imipramine Desipramine Clomipramine	•Enhances the sedation •Orthostatic hypotension
VITAMINS	Vitamin A Vitamin D	•Vitamin A should be monitered when taken with alcohol to prevent retinol induced hepatoxicity •Vitamin D hydroxylation is hampered by the liver damage of alcohol

DRUG INTERACTIONS

ANTICOAGULANTS	**WARFARIN**	**•Acute alcoholism decreases warfarin metabolism. Chronic alcoholism increases metabolism of warfarin. •Disulfiram reaction**
ANTIDIABETIC AGENT	Chlorpropamide Glyburide Glipizide Tolbutamide metformin	•Hypoglycemia •Chlorpropamide,glyburide ,tolbutamide causes disulfiram like reaction •Metformin increases levels of lactic acid in blood after alcohol consumption
BARBITURATES	Phenobarbital	•Increase in barbiturate metabolism by cytochrome P450 •Enhances sedative, hypnotic effect on CNS

DRUG INTERACTIONS

MEDICATIONS CAUSING DISULFIRAM LIKE REACTIONS:

ANALGESICS –Phenacetin
Phenylbutazone

ANTIBIOTICS-

- Cefoperazone
- Cefotetan
- Chloramphenicol
- Griseofulvin
- Isoniazid
- Metronidazole
- Nitrofurantoin
- Sulfamethoxazole
- Sulfisoxazole

CARDIOVASCULAR MEDICATIONS
Isosorbide dinitrate
(nitrates) Nitroglycerin

DIABETES MEDICATIONS
Chlorpropamide
(sulfonylureas) Glyburide
Tolazamide
Tolbutamide

ANTICOAGULANTS
Warfarin

Risk Factors Examples: Simultaneous Drug Use or Drug-Drug Interactions

- Cerivastatin-Gemfibrozil interactions in hypercholesterolemia patients (rhabdomyolysis)
- Coumadin-NSAID interactions (increased inhibition of platelet aggregation)
- Venlafaxine-indinavir interactions in depressed HIV-infected patients (decreased indinavir concentrations)

Drug-Food interactions

- A drug-food interaction happens when the food you eat affects the ingredients in a medicine you are taking so the medicine cannot work the way it should.

1.	Bisphosphonates+ Any drug	Reduced effectiveness of drug'
2.	Benzodiazepines + grapefruit	Inhabit enzymes involved in drug metabolism
3.	Digoxin + Oatmeal	Decreased adsorption of drug
4.	Aspirin + Milk	Upset stomach
5.	Acetaminophen + Alcohol	Liver damage
6.	MAO Inhibitors + food(tyramine)	Severe headache
7.	Tetracycline's + calcium food	Reduced absorption of drug
8.	Warfarin + Vitamin K	Reduced effect of drug
9.	Celecoxib + Milk	Upset stomach
10.	Naproxen + fatty food	Upset stomach
11.	Oxycodon + Alcohol	Coma , asthma
12.	Caffeine + food	Rapid heart beat