

## Drug–Drug Interaction

It is a reaction between two (or more) drugs, also there may be reaction between a drug and a food, beverage, or supplement. A drug interaction can affect how a drug works, may decrease (antagonistic) or increase (synergistic) the effectiveness of a drug or cause unwanted side effects.

Normally there are three types of drug interactions:

- **Drug–drug interaction:** A reaction between two or more drugs, for example, drugs that slow down breathing rate, such as opioids, alcohol, antihistamines, CNS depressants or general anesthetics, should not be taken together because these combinations increase the risk of life-threatening respiratory depression.
- **Drug–food interaction:** A reaction between a drug and food, herb or beverage. For example, consuming both ambien and alcohol (both depressants) influxes the GABA receptors, resulting in the over-stimulation of sleep-inducing chemicals, resulting in unconsciousness.
- **Drug–disease interaction:** A reaction of drug with disease condition, for example, taking a nasal decongestant if a person is suffering with high blood pressure may cause an unwanted reaction. Drug–disease interactions can occur in any age group but are more common among older people, who tend to have more diseases.

Direct interaction between drugs is also possible when two drugs are mixed prior to administration, e.g. mixing of Thiopentone and Suxamethonium can produce precipitation of thiopentone.

Duplication of drugs is also possible when two drugs taken that have the same active ingredient may produce severe effect. For example, health care provider may prescribe a cold remedy together with a sleep aid, both of which contain diphenhydramine or a cold remedy and a pain reliever, both of which contain acetaminophen. This type of duplication is possible when drugs used that contain multiple ingredients or that are sold with different brand names (thus appearing to be different but actually containing the same ingredients).

Sometimes, drugs that are helpful in one disease are harmful in another disorder. For example, some beta-blockers taken for heart disease or high blood pressure can worsen asthma and make it hard for people with diabetes to tell when their blood sugar is too low. Some drugs taken to treat a cold may worsen glaucoma. People with diabetes, high or low blood pressure, an ulcer, glaucoma, an enlarged prostate, poor bladder control, and insomnia are more sensitive to have a drug–disease interaction.

Sometimes drugs with narrow therapeutic range with a little difference between therapeutic and lethal dose may produce very serious drug interaction. Such as digitoxin with some antibiotics, e.g. erythromycin will increase the toxicity of digitoxin because antibiotic effect the liver enzyme results in slow metabolism of digitoxin or inactivating.

Isoniazid with paracetamol increases risk of liver damage (hepatotoxicity).

Aspirin (also reduces platelets) increases risk of bleeding when given with warfarin, heparin and anti-depressant.

### How to Avoid Drug Interactions

A health care provider must know all about prescription (including all previous prescriptions) and non-prescription medicines taken by the patient or plan to take the medicines.



A health care provider must know all about other conditions of the patient may have, such as blood pressure, diabetes, thyroid or allergic problems, etc.

A health care provider must inform the patient all about the prescribed medicines such as:

- Main effect/use of medicine and how drug work in/on the body.
- Side effect or allergic reactions of medicine.
- How to take the medicine?
- What should be avoided by the patient during treatment like other medicine, certain foods or beverages?
- How to reduce the risk of drug interactions and unwanted side effects?
- In case of drug interaction what action should be taken?

Following table indicates some drug-drug interactions published in research papers:

Object Drug or Drug Class	Precipitant Drug or Drug Class
Anticoagulants: Dicumarol, warfarin, etc.	Thyroid hormones: Levothyroxine, destrothyroxine, etc.
Benzodiazepines (alprazolam, triazolam)	Azole antifungal agents: Fluconazole, ketoconazole, etc.
Carbamazepine	Propoxyphene
Cyclosporine	Rifamycins: Rifampin, rifabutin, etc.
Dextromethorphan	MAO (monoamine oxidase) inhibitors: Isocarboxazid, phenelzine, etc.
Digoxin	Clarithromycin
Ergot alkaloids: Dihydroergotamine, ergotamine, etc.	Macrolide antibiotics: Clarithromycin, erythromycin, etc.
Estrogen—oral contraceptives	Rifampin
MAO (monoamine oxidase) inhibitors: Isocarboxazid, phenelzine, etc.	Anorexiant: Amphetamine, benzphetamine, etc. Sympathomimetics: Dopamine, ephedrine, etc. Meperidine
Methotrexate	Trimethoprim
Nitrates: Nitroglycerin, dinitrate/mononitrate, etc.	Sildenafil
Pimozide	Macrolide antibiotics: Clarithromycin, erythromycin, etc.
Theophyllines	Quinolones (ciprofloxacin, enoxacin) Fluivoxamine
Thiopurines (azathioprine, mercaptopurine)	Allopurinol
Warfarin	Nonsteroidal anti-inflammatory drugs: Ibuprofen, diclofen, indomethacin, etc. Fibric acid derivatives: Clofibrate, fenofibrate, etc. Barbiturates: Amobarbital, butabarbital, etc.



## Experiment 7

### Object

Identify drug-drug interaction in the given prescription.

### Presentation

Mr. XFX, a 50-year-old male, suffering with hyperthyroidism with APD (acid-peptic disorders).

### Current Prescription

- Thyroxin                      50 mcg              OD
- Pantoprazole                40 mg                OD

### Possible Drug Interaction

- Pantaprazole as PPI (proton pump inhibitor) inhibits action of thyroxine.

### Remedy Suggested

- Pantaprazole should be given at least at a difference of 12 hours with thyroxin.



## Experiment 8

### Object

Identify drug-drug interaction in the given prescription.

### Presentation

Mr. ZWZ, a 60-year-old male, suffering with anemia with calcium deficiency.

### Current Prescription

- Iron tablet OD
- Calcium tablet OD

### Possible Drug Interaction

- Calcium acts as a chelating agent on iron so reduces its absorption.

### Remedy Suggested

- Calcium tablet and iron tablet should not be taken together, so calcium tablet can be given after breakfast and iron tablets after dinner.





## Experiment 9

### Object

Identify drug-drug interaction in the given prescription.

### Presentation

Mr/Mrs \_\_\_\_\_, a \_\_\_\_\_-year-old male/female suffering with \_\_\_\_\_.

### Current Prescription

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

### Possible Drug Interaction

- \_\_\_\_\_
- \_\_\_\_\_

### Remedy Suggested

- \_\_\_\_\_ should be replaced with because
- \_\_\_\_\_ foods/beverages should be avoided because
- \_\_\_\_\_ are possible allergic conditions.



## Experiment 10

### Object

Identify drug-drug interaction in the given prescription.

### Presentation

Mr/Mrs \_\_\_\_\_, a \_\_\_\_\_-year-old male/female suffering with \_\_\_\_\_.

### Current Prescription

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

### Possible Drug Interaction

- \_\_\_\_\_
- \_\_\_\_\_

### Remedy Suggested

- \_\_\_\_\_ should be replaced with because
- \_\_\_\_\_ foods/beverages should be avoided because
- \_\_\_\_\_ are possible allergic conditions.



## Experiment 11

### Object

Identify drug-drug interaction in the given prescription.

### Presentation

Mr/Mrs \_\_\_\_\_, a \_\_\_\_\_-year-old male/female suffering with \_\_\_\_\_.

### Current Prescription

- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_

### Possible Drug Interaction

- \_\_\_\_\_
- \_\_\_\_\_

### Remedy Suggested

- \_\_\_\_\_ should be replaced with because
- \_\_\_\_\_ foods/beverages should be avoided because
- \_\_\_\_\_ are possible allergic conditions.



**VIVA VOCE/ SYNOPSIS**

- Q1.** Define drug interaction.
- Q2.** Write the name of various types of drug interactions.
- Q3.** Write example of pharmaceutical type of drug interaction (interaction outside the body).
- Q4.** Give one example of food-drug interaction.
- Q5.** Write one example of drug-disease interaction.
- Q6.** Write the drug interaction remedy of thyroxin and pentaprazole.
- Q7.** Write example of positive type of drug interaction.
- Q8.** Give example of therapeutic type of drug interaction.

**MCQs**

- Q1.** Which of the following drug has narrow therapeutic range or index?  
 (1) Digitoxin                      (2) Cetrizine                      (3) Erythromycin                      (4) Paracetamol
- Q2.** The remedy of thyroxin and pentaprazole drug interaction is to administer pentaprazole at:  
 (1) 12 hours interval              (2) 6 hours interval              (3) Both drugs at same time              (4) None
- Q3.** The drug interaction of iron and calcium tablets is example of:  
 (1) Retard absorption              (2) Retard distribution              (3) Delay excretion                      (4) All of the above
- Q4.** Aspirin along with warfarin increases the risk of:  
 (1) Bleeding                      (2) Reducing platelets              (3) Both                      (4) None
- Q5.** Mixing of thiopentone with suxamethonium is an example of which interaction:  
 (1) Precipitation                      (2) Retard absorption  
 (3) Alter distribution              (4) Therapeutic drug interaction

**Ans**

- Q1.** (1)              **Q2.** (1)              **Q3.** (1)              **Q4.** (3)              **Q5.** (1)

