DRUG INTERACTIONS

When two different drugs are taken together, or when a drug is taken in combination with certain foods or with alcohol, this may produce effects different from those produced when the drug is taken alone. Often, this is beneficial and doctors frequently make use of interactions to increase the effectiveness of a treatment. Very often, more than one drug may be prescribed to treat cancer or high blood pressure (hypertension).

Other interactions, however, are unwanted and may be harmful. They may occur not only between prescription drugs, but also between prescription and over-the-counter drugs. It is important to read warnings on drug labels and tell your doctor if you are taking any preparations – both prescription and over-the-counter, and even herbal or homeopathic remedies.

A drug may interact with another drug or with food or alcohol for a number of reasons (see below).

EXAMPLES OF IMPORTANT INTERACTIONS

Adverse interactions between drugs may vary from a simple blocking of a drug's beneficial effect to a serious reaction between two drugs that may be life-threatening. Some of the more serious adverse interactions occur between the following:

Drugs that depress the central nervous system (opioids, most antihistamines, sleeping drugs, and alcohol). The effects of two or more of these drugs together may be additive, causing dangerous oversedation.

Drugs that lower blood sugar levels and such drugs as sulphonamides and alcohol. The drug interaction increases the effect of blood-sugar-lowering drugs, thus further depressing blood sugar levels.

Oral anticoagulants and other drugs, particularly aspirin and antibiotics. As these drugs may increase the tendency to bleed, it is essential to check the effects in every case.

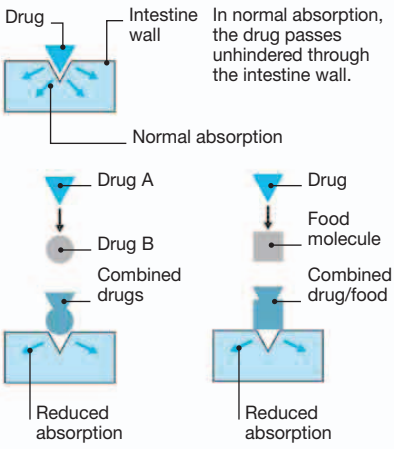
Monoamine oxidase inhibitors (MAOIs). Many drugs and foods can produce a severe increase in blood pressure when taken with MAOIs. Such drugs include amphetamines and decongestants; foods include cheese, herring, chocolate, red wine, and beer. Some of the newer MAOIs, however, are much less likely to interact with food and drugs.

Altered absorption

Alcohol and some drugs (particularly opioids and drugs with an anticholinergic effect) slow the digestive process that empties the stomach contents into the intestine. This may delay the absorption, and therefore the effect, of another drug. Other drugs (for example, metoclopramide, an anti-emetic drug) may speed the rate at which the stomach empties and may, therefore, increase the rate at which another drug is absorbed and takes effect.

Some drugs also combine with another drug or food in the intestine to form a compound that is not absorbed as readily. This occurs when tetracycline and iron tablets or antacids are taken together. Milk and dairy products also reduce the absorption of tetracycline and some other drugs, such as ciprofloxacin, by combining with the drugs in this manner.

Drug absorption in the intestine



Absorption of drug (A) may be reduced if it combines with another drug (B).

Absorption of a drug may be reduced if it combines with a food molecule.

Enzyme effects

Some drugs increase the production of enzymes in the liver that break down drugs, while others inhibit or reduce enzyme production. Thus they affect the rate at which other drugs are activated or inactivated.

Excretion in the urine

A drug may reduce the kidneys' ability to excrete another drug, raising the drug level in the blood and increasing its effect.

Receptor effects

Drugs that act on the same receptor sites (p.14) sometimes add to each other's effect on the body, or compete with each other in occupying certain receptor sites. For example, naloxone blocks receptors used by opioid drugs, thereby helping to reverse the effects of opioid poisoning.

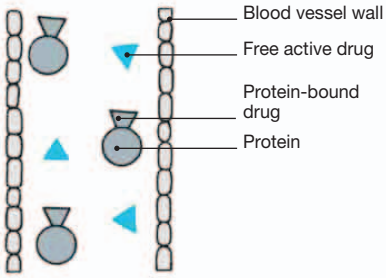
Similar or opposite effects

Drugs that produce similar effects (but act on different receptors) add to each others' actions. Often, lower doses are possible as a result, with fewer adverse effects. This is common practice in the treatment of high blood pressure and cancer. Antibiotics are given together as the infecting organisms are less likely to develop resistance to the drugs. Drugs with antagonistic effects reduce the useful activity of one or both drugs. For example, some antidepressants oppose the effects of anticonvulsants.

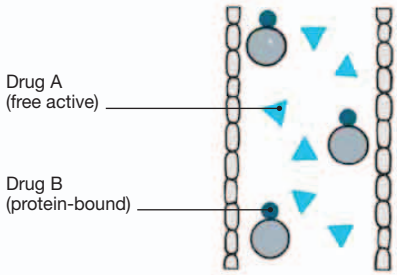
Reduced protein binding

Some drugs circulate around the body in the bloodstream with a proportion of the drug attached to the proteins of the blood plasma. The amount of drug attached to the plasma proteins is inactive. If another drug is taken, some of the second drug may also bind to the plasma proteins and displace the first drug; more of the first drug is then active in the body.

Interaction between protein-bound drugs



Protein-bound drug taken alone
Drug molecules that are bound to proteins in the blood are unable to pass into body tissues. Only free drug molecules are active.



Taken with another protein-bound drug
If a drug (B) with a greater ability to bind with proteins is also taken, drug (A) is displaced, increasing the amount of active drug.