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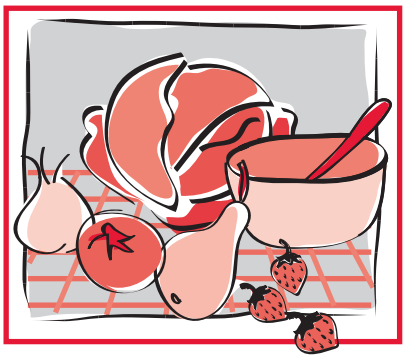

Nutrient-Drug Interactions and Food

Fact Sheet No. **9.361** Food and Nutrition Series | **Health**

by L. Bellows and R. Moore*

The complex interaction between food, nutrients, and drugs, make it difficult to accurately determine the exact effects of these relationships in the body. A *drug* is defined as a substance used in the diagnosis, treatment, or prevention of a disease, or component of a medication. There are many dramatic results and problems that may be caused by food-drug, drug-drug, and alcohol-food-drug interactions, and these vary from person to person. *Drug-nutrient interactions* involve changes to a drug caused by a nutrient, or changes to a nutrient as a result of the drug. *Food-drug interactions* is a broader term that describes the effects of a drug on nutritional status. Each of these interactions may lead to many complications. Table 1 summarizes several possible interactions of drugs with foods, nutrients, supplements, or other drugs, which may produce unexpected side-effects or cause additional health problems.

Effects of *Food* on Drug Intake

Drug Absorption: Food or nutrients in the stomach or intestine may act to reduce the absorption of a drug by delaying digestion, binding to minerals found in the food, or adhering to food particles. In other cases, the food may promote drug absorption.

Drug Breakdown: Food may act to enhance or inhibit the metabolism of certain drugs in the body.

Drug Excretion: Food and nutrients may act to alter the reabsorption and excretion of drugs from the kidney.

Other Actions: Certain food components can lead to the enhancement or opposition of the effects of some drugs. Some examples of food and constituents found in food include: vitamins, minerals, fat, proteins, caffeine, or alcohol.

Effects of *Drugs* on Food and Nutrition

Nutrient Absorption: Certain drugs may increase, decrease, or prevent nutrient absorption in the gut.

Nutrient Breakdown: Drugs may speed up the metabolism of certain nutrients, resulting in higher dietary requirements of that particular nutrient.

Nutrient Excretion: Drugs can increase or decrease the urinary excretion of nutrients.

Side Effects of Drugs and Other Medications

Taste and Smell Alterations: Some drugs may alter one's ability to taste and smell certain foods. Food intake may be affected due to alteration of taste sensation, reduced acuity to taste, or undesirable aftertaste.

Gastrointestinal (GI) Effects: Some drugs can cause irritation to the digestive tract that includes stomach upset, nausea, vomiting, diarrhea, constipation, ulcers, and gastric bleeding. Some drugs may alter gastric acidity and damage mucosal surfaces leading to decreased nutrient absorption.

Appetite Changes: Alterations in appetite may include suppression or stimulation of hunger leading to weight loss or weight gain.

Organ Toxicity: Since many drugs must pass through the liver and kidney upon excretion, hepatotoxicity (liver damage) and nephrotoxicity (kidney damage) are of primary concern.

Metabolic Effects: Some drugs may affect blood glucose levels by stimulating the production of glucose or inhibiting its uptake. Other drugs may inhibit insulin secretion, decrease insulin sensitivity, or increase insulin clearance from the blood. This may lead to conditions known as hyperglycemia (high blood glucose), hypoglycemia (low blood glucose), or diabetes. Other medications may lead to abnormal lipid levels, causing elevated cholesterol or triglycerides.

Quick Facts

- There are many types of complex drug-nutrient and food-drug interactions that can occur in the body.
- Drugs and medications have the potential to produce many side effects including changes in taste, appetite, digestion, and metabolism.
- While pregnant and/or nursing, consult a physician or pharmacist before taking any medication. Drugs taken by the mother may affect the infant.
- Check with a doctor or pharmacist for the proper method and time to take medication.
- Refer to a physician if health problems persist.

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*L. Bellows, Colorado State University Extension food and nutrition specialist and assistant professor; R. Moore, graduate student. 9/2013

Table 1. Food, Nutrient, and Drug Interactions.
This table is intended to be used as a guide only. Consult a doctor or pharmacist with all questions related to your medication. Special Note: Alcohol can increase the effect of many drugs, and should be avoided with the use of all drugs. It also results in an increased risk for stomach bleeding and other side effects.

Condition	Drug	Use	Interactions/Guidelines	Examples[1]
Allergies	Antihistamine	To relieve or prevent the symptoms of colds, hay fever and allergies.	**Food:** Take with water, if GI distress occurs consume with food. **Exception**: Fexofenadine/ALLEGRA. Bioavailability decreases if taken with apple, orange, or grapefruit juice. **Other drugs**: Avoid taking sedatives or anti-depressants. **Avoid alcohol**.	Diphenhydramine/BENADRYL Fexofenadine/ALLEGRA* Loratadine/CLARITIN Cetirizine/ZYRTEC *Do not take with juice.
Arthritis and Pain	Analgesic/Antipyretic	To treat mild to moderate pain and fever.	**Food:** For rapid relief, take on empty stomach. **Caffeine:** May increase the rate of absorption of the drug. **Avoid alcohol**.	Acetaminophen/TYLENOL TEMPRA
	Non-Steroidal Anti-Inflammatory Drugs (NSAIDS)	To reduce, pain, fever and inflammation.	**Food:** Take with food, water, or milk to decrease stomach upset. With a high dose of this drug, one may need to increase consumption of vitamin C, vitamin K, and folate. **Caffeine**: Limit intake. **Supplements**: Limit or avoid products that affect blood coagulation (garlic, ginger, gingko, ginseng, or horse chestnut.) **Avoid alcohol**.	Aspirin/BAYER, ECOTRIN Ibuprofen/MOTRIN, ADVIL Naproxen/ANAPROX,ALEVE, NAPROSYN
	Corticosteroids	To relieve inflamed areas of the body, reduce swelling and itching, allergies,rheumatoid arthritis, and other conditions.	**Food:** Take with food or milk to decrease stomach upset. Limit grapefruit and other citrus fruits. While taking this drug, one may need to decrease sodium, and supplement the diet with calcium, vitamin D, K, A, C, or protein. **Caffeine**: Limit intake. **Avoid alcohol**.	Methyprednisolon/MEDROL Prednisone/DELTASONE Prednisone/ORAPRED PRELONE Cortisone acetate/CORTEF
	Narcotic Analgesic	To provide relief for moderate to severe pain.	**Food**: Take with food or milk to decrease stomach upset. **Avoid alcohol**.	Codeine combined with acetaminophen/TYLENOL Morphine/ROXANOL, MS CONTIN
Asthma	Bronchodilators	To treat the symptoms of bronchial asthma, chronic bronchitis, and emphysema.	**Food:** Take with food if stomach upset occurs. High-fat meals may increase the amount of theophylline in the body, while high-carbohydrate meals may decrease it. Different foods may have varying effects depending on the dose form. **Caffeine:** Avoid eating or drinking large amounts of foods and beverages that contain caffeine. **Avoid alcohol**.	Theophylline/SLO-BID, THEO-DUR, UNIPHYL Albuterol/VENTOLIN, PROVENTIL, COMBIVENT Epinephrine/PRIMATENE MIST
Cardio-vascular Disorders	Diuretics	To help eliminate water, sodium, and chloride from the body.	**Food:** Take on an empty stomach since food reduces drug availability. Take with food or milk if stomach upset occurs. Since some diuretics cause loss of potasium, calcium, and magnesium, supplementation of these minerals may be necessary. Trimterene is known as a "potassium sparing" diuretic. When taking triamterene avoid eating large amounts of potassium-rich foods such as bananas, oranges and green leafy vegetables or salt substitutes. Avoid natural licorice.	Fuorsemide/LASIX Triamterene/ hydrochlorothiazide DYAZIDE, MAXZIDE Hydrochlorothiazide/ HYDRODIURIL Trimterene/DRYENIUM Bumetamide/BUMEX Metolazone/ZAROXOLYN

Table 1. Food and Drug Interactions. (continued)

Condition	Drug	Use	Interactions/Guidelines	Examples[1]
Cardio-vascular Disorders (continued)	Cholesterol Lowering		**Food**: Take with food. Do not take with grapefruit or other citrus fruits. Follow a diet low in cholesterol and dietary fat. **Other drugs**: Do not take with the drug Cordarone (intended for abnormal heart rhythms). **Avoid alcohol**.	Zocor/SIMVASTATIN
	Beta Blockers	To decrease the nerve impulses to blood vessels.	**Food:** Take with food to increase bioavailability. Take separately from orange juice, and avoid natural licorice. It may be necessary to decrease dietary calcium and sodium, which may decrease absorption. **Supplements:** Take 2 hours before or 6 hours after calcium supplement or antacids. **Avoid alcohol**.	Atenolol/TENORMIN Metoprolol/LOPRESSOR Propranolol/INDERAL Nadolol/CORGARD
	Nitrates	To relax blood vessels and lower the demand for oxygen by the heart.	**Food:** Take on an empty stomach with water to increase absorption, 1 hour before meals or 2 hours after. **Avoid alcohol**.	Isosorbide dinitrate/ ISORDIL, SORBITATE Nitroglycerin/ NITRO, NITRODUR, TRANSDERM-NITRO
	Angiotension Converting Enzyme (ACE Inhibitors)	To relax blood vessels by preventing angiotension II a vasoconstrictor from being formed.	**Food:** Take catropil/CAPOTEN or moexipril/UNIVASC on an empty stomach, 1 hour before meals (since food decreases absorption.) High fat meals decrease absorption of quinapril/ ACCUPRIL. Ensure adequate fluid intake. Avoid salt, calcium, and natural licorice.	Captopril/CAPOTEN Enalapril/VASOTEC Lisinopril/PRINIVIL, ZESTRIL Quinapril/ACCUPRIL Moexipril/UNIVASC
	HMG-CoA Reductase	Known as “statins” intended to lower cholesterol, and reduce the production rate of LDL (bad) cholesterol.	**Food:** Avoid grapefruit/related citrus with atorvastatin/LIPITOR, lovastatin/MEVACOR, and simvastatin/ ZOCOR. Lovastatin/MEVACOR should be taken with the evening meal to enhance absorption. Decrease dietary fat and cholesterol while taking these medications. **Supplements**: Avoid St. John’s wort. **Avoid alcohol**.	Atorvastatin/LIPITOR Fluvastatin/LESCOL Lovastatin/MEVACOR and ALTOPREV Pitavastatin/Livalo Pravastatin/PRAVACHOL Rosuvastatin/ CRESTOR Simvastatin/ZOCOR
	Anticoagulants	To prevent the formation of blood clots.	**Food:** Limit foods with vitamin K, since it produces blood-clotting substances that reduce the effectiveness of anticoagulants. Do not exceed the upper limit for vitamin E and A. High doses of vitamin E (400 IU or more) may prolong clotting time and increase the risk of bleeding. **Supplements**: Avoid garlic, ginger, ginko saw palmetto, and horse chestnut. **Other drugs**: Do not take with Cordarone (intended for abnormal heart rhythms.)	Warfarin/COUMADIN
Infections	Antibiotics and Antifungals	To treat infections caused by bacteria and fungi.	**General Guidelines:** Tell the doctor if you experience skin rashes or diarrhea. If you are using birth control, consult with your health care provider because some methods may not work when taken with antibiotics. Be sure to finish all of your medication even if you start feeling better. Take medication with plenty of water.	
	Antibacterials/Penicillin	To treat infections caused by bacteria and fungi.	**Food:** Take on an empty stomach, or 1 hour before or 2 hours after food. If upset stomach occurs, take with food. Avoid guar gum. **Supplements**: Use caution when taking vitamin K.	Penicillin V/ VEETIDS Amoxicillin/TRIMOX, AMOXIL Ampicillin/PRINCIPEN, OMNIPEN

Table 1. Food and Drug Interactions. (continued)

Condition	Drug	Use	Interactions/Guidelines	Examples[1]
Infections (continued)	Quinolones	To treat infections caused by bacteria and fungi.	**Food**: Take on an empty stomach 1 hour before or 2 hours after meals. If if upset stomach occurs, take with food, but not with dairy or calcium-fortified products alone. **Caffeine**: Taking these medications with caffeine-containing products may increase caffeine levels, leading to excitability and nervousness.	Ciproflaxacin/CIPRO Levoflaxacin/LEVAQUIN Ofloxacin/FLOXIN Trovafloxacin/TROVAN
	Cephalosporins	To treat infections caused by bacteria and fungi.	**Food**: Take on an empty stomach 1 hour before or 2 hours after meals. If upset stomach results, take with food. Take 1 hour before antacid supplement.	Cefaclor/CECLOR CECLOR CD Cefradroxil/DURICEF Cefixime/SUPRAX Cefprozil/CEFZIL Cephalexin/KEFLEX,KEFTAB
	Macrolides	To treat infections caused by bacteria and fungi.	**Food**: May take with food if stomach upset occurs. **Exceptions**: Zmax should be taken on an empty stomach one hour before or 2 hours after food. Avoid taking with citrus foods, citrus juices, and carbonated drinks.	Azithromycin/ZITHROMAX (Z-Pak, Zmax) Clarithromycin/BIAXIN ERYTHROMYCIN (Ery-Tab, ERYCE)
	Sulfonamides	To treat infections caused by bacteria and fungi.	**Food**: Take with food and at least 8 ounces of water. **Avoid alcohol**.	Sulfamethoxazole + trimethoprim/BACTRIM, SEPTRA
	Tetracyclines	To treat infections caused by bacteria and fungi.	**Food**: Take on an empty stomach with 8 ounces of water. Avoid taking tetracycline with dairy products, antacids, and vitamin supplements containing iron because they can interfere with the medication's effectiveness.	Tetracycline/ ACHROMYCIN, SUMYCIN Doxycycline/VIBRMYCIN Minocycline/MINOCIN
	Nitromidazole	To treat infections caused by bacteria and fungi.	**Food**: May take with food to decrease stomach upset, but food decreases bioavailability. **Avoid alcohol**.	Metronidazole/FLAGYL
	Antifungals		**Food**: Take with food to increase absorption. Do not take itraconazole/ SPORANOX with grapefruit or related citrus. **Avoid alcohol**.	Fluconazole/DIFLUCAN Ketoconazole/NIZORAL Itraconazole/SPORANOX
Mood Disorders	Monoamine Oxidase (MAO) Inhibitors	To treat depression, emotional and anxiety disorders.	**Food**: These medications have many dietary restrictions and those taking them should follow the dietary guidelines and physician instructions very carefully. A rapid, potentially fatal increase in blood pressure can occur if foods or alcoholic beverages containing tyramine are consumed while taking MAO inhibitors. Avoid foods high in tyramine and other pressor amines during drug use and for 2 weeks after discontinuation. These include aged cheeses, aged meats, soy sauce, tofu, miso, fava beans, snowpeas, sauerkraut, avocadoes, bananas, yeast extracts, raisins, ginseng, licorice, chocolate, and caffeine. **Avoid alcohol**.	Phenelzine/NARDIL Tranycypromine/PARNATE
	Anti-Anxiety Drugs	To treat depression, emotional and anxiety disorders.	**Food**: May take with food if upset stomach occurs. Limit grapefruit and citrus consumption. **Caffeine**: May cause excitability, nervousness, and hyperactivity and lessen the anti-anxiety effects of the drugs. **Supplements**: Use caution with sedative herbal products such as chamomile, kava, or stimulants such as caffeine, guarana, or mate. **Avoid alcohol**.	Lorazepan/ATIVAN Diazepam/VALIUM Alprazolam/XANAX

Table 1. Food and Drug Interactions. (continued)

Condition	Drug	Use	Interactions/Guidelines	Examples[1]
Mood Disorders (continued)	Antidepressant Drugs	To treat depression, emotional and anxiety disorders.	**Food**: These medications can be with or without food. **Avoid alcohol**.	Paroxetine/PAXIL Sertraline/ZOLOFT Fluoxetine/PROZAC
	Stimulant		**Food**: Take with or without meals. Limit caffeine, and ensure adequate calcium intake.	Methylphenidate/RITALIN
	Depressant	Sedative-hypnotic	**Food**: Do not take with food, or immediately after a meal.	Zolpidem/AMBIEN
Stomach	Histamine Blockers	To relieve pain, promote healing, and prevent irritation from returning.	**Food**: These medications can be taken with or without food, with 8 ounces of water. A bland diet is recommended. Take drug 2 hours before an iron or antacid supplement is consumed. May decrease iron and vitamin B12 absorption. **Caffeine**: Caffeine products may irritate the stomach. **Avoid alcohol**.	Cimetidine/TAGAMET Famotidine/PEPCID Ranitidine/ZANTAC Nizatadine/AXID
Seizures	Anticonvulsant/ Antiepileptic Therapy		**Food**: Take with food or milk to decrease stomach upset. Avoid grapefruit or related citrus fruits, star fruits, or pomegranate juice. Supplement with calcium and vitamin D. **Avoid alcohol**.	Tegretol/CARBAMAZEPINE Equetro Carbatrol

[1] The generic name for each drug is stated first. Brand names are in all capital letters and represent only some examples of those medications.

References

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