Drug Nutrient Interactions

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Drug Nutrient Interactions

- Socrates once declared that medicine "acts as both remedy and poison"
- Today, a full 61% of adults use at least one drug to treat a chronic health problem, a nearly 15% rise since 2001.
- More than 1 in 4 seniors gulp down at least five medications daily.
Quiz

○ If you take blood thinners, which food should be eaten in moderation
○ A Chicken
○ B Kale
○ C Pasta

Answer

○ B Kale
○ Dark greens are high in vitamin K, which naturally assists in blood clotting
○ If you’re on a blood thinner, such as warfarin or Coumadin, monitor your intake of vegetables like kale, spinach, Brussel sprouts, broccoli and spinach
○ **Consistent** intake is important
○ These foods can counteract the effect of the medication
Question

- If you’re on a blood pressure medication, which juice should you avoid?
- A Guava
- B Passion fruit
- C Grapefruit

Answer

- C Grapefruit
- Contains a compound that interferes with the body’s ability to metabolize certain calcium channel blockers allowing more – sometimes too much – of the drug to enter the bloodstream
- Could lead to an overdose, causing blood pressure to drop to potentially dangerous levels
Question

- Which beverage would likely cause the greatest spike in blood sugar when sipped with a fast food meal?
  - A Lemonade
  - B Coffee
  - C Orange soda

Answer

- B Coffee
- Researchers found that a meal with a high fat content inhibits a person’s ability to clear sugar from the bloodstream
- As a result, healthy subjects’ blood sugar levels jumped 32%
- When subjects were given 2 cups of coffee, the spike in blood sugar more than doubled to levels approaching those of people at risk for diabetes
Coffee

- For years, various studies have reported that coffee drinkers are less likely to develop Type 2 diabetes.
- A recent UCLA study found that "women who drink at least 4 cups of coffee a day are less than half as likely to develop diabetes as non-coffee drinkers."
- Coffee may improve the body’s tolerance to glucose by increasing metabolism or lowering insulin resistance – but not with a high fat meal.

Question

- Which nutrients are depleted if you take H-2 receptor antagonists: (Pepcid, Tagamet, Zantac)?
  - A - Vitamin B 12
  - B - Folic Acid
  - C - Vitamin D
  - D - Calcium
  - E - Iron
Answer

- All of the above, as well as zinc

Medication

- Medications can deliver lifesaving therapy or pain relief
- But drugs also can interact with common foods in our diet, from dairy products to leafy green vegetables, and produce undesirable results – lessening or increasing the potency of medication
Medication

- When you swallow a pill you set a series of steps in motion
  - First, the drug travels to your stomach where it is dissolved into a useful form
  - Then it is absorbed into your bloodstream where it is transported to its “action site.”

Medication

- Finally, the drug is excreted from your body by the kidneys and/or liver
- Certain foods and nutrients can **interfere** with this process throughout all of these steps
Medication

- The most common way foods interfere with drugs is by hindering the drug’s absorption so that its action is minimized.
- The single most frequent dietary component responsible for drug/nutrient interactions is **alcohol**, which can undermine your medication in a number of ways.
- Can increase the **risk for liver toxicity**.

Alcohol

- A total of **942 drugs** (6243 brand and generic names) are known to interact with Alcohol (contained in alcoholic beverages) (ethanol).
  - **166 major** drug interactions (1616 brand and generic names)
  - **740 moderate** drug interactions (4234 brand and generic names)
  - **36 minor** drug interactions (393 brand and generic names)
Of over 1,400 drugs and fixed-drug combinations used in the U.S.:

- **Almost 400** may deplete specific nutrients
- **Over 400** may interact with food or food components
- **Over 300** have been shown to interact with dietary supplements, with adverse and beneficial interactions equally common

**Drug-Nutrient Interactions**

- Medications, both prescription and over-the-counter, can affect how the body uses nutrients
- For people taking medications for long periods of time, these interactions may lead to **vitamin or mineral deficiencies**
Pharmaceutical Drugs

- Pharmaceutical drugs are **62,000 times more likely to kill you than supplements**
- 7,750 times more likely to kill you than herbal remedies
- Adverse Drug Reactions (ADRs) are now the *fourth leading cause of death in the United States after heart disease, cancer, and stroke.*

Prescriptions

- Do the prescriptions you take affect your nutritional status?
- Americans are taking more drugs than ever before
- Nearly half of Americans of all ages and 9 out of 10 older Americans now take at least one prescription drug, according to the Centers for Disease Control
Effects of Interactions

- **Nutrient depletion:**
  - Individual nutrients may have their dietary requirement increased by specific drugs or supplements. Example: statins and CoQ10

- **Adverse:**
  - A specific supplement may undesirably decrease or increase the effect of a drug or supplement being taken. Example: Coumadin and Spinach

- **Beneficial:**
  - Drugs or supplements may have their actions enhanced or side effects diminished by specific supplements. Example: Fish oils and antidepressants

Drug-Induced Nutrient Depletion

- **About one-half of the drugs used in clinical practice have documented nutrient-depleting effects**
  - Co-enzyme Q10, folic acid, B2, B6, Magnesium, and Zinc are nutrients most likely to be depleted

- **Mechanisms include:**
  - Impaired absorption
  - Increased excretion
Definition of Terms

- **Drug-nutrient interaction**: the result of the action between a drug and a nutrient that would not happen with the nutrient or the drug alone
- **Food-drug interaction**: a broad term that includes drug-nutrient interactions and the effect of a medication on nutritional status

Food-Drug Interaction

- For example, a drug that causes chronic nausea or mouth pain may result in poor intake and weight loss
Key Terms

- **Bioavailability**: degree to which a drug or other substance reaches the circulation and becomes available to the target organ or tissue
- **Half-life**: amount of time it takes for the blood concentration of a drug to decrease by one half of its steady state level
- **Side effect**: adverse effect/reaction or any undesirable effect of a drug

Pharmacogenomics

- Different people metabolize drugs differently
- Genetically determined
Slow/Fast Metabolizers

- Genetic variants influence how we respond to certain drugs.
- This class of genetic testing is called pharmacogenetics
- CYP2D6 and CYP2C19 metabolize 25% of drugs including many antidepressants, antipsychotics, and narcotics
- Slow metabolizers at risk for toxicity and adverse drug effects
- Fast metabolizers have unpredictable response
- Drug genotyping in future will help determine most effective meds for individuals
Benefits of Minimizing Food Drug Interactions

- Medications achieve their intended effects
- Improved compliance with meds
- Less need for additional medication or higher dosages
- Fewer caloric or nutrient supplements are required
- Adverse side effects are avoided

Benefits of Minimizing Food Drug Interactions

- Optimal nutritional status is preserved
- Accidents and injuries are avoided
- Disease complications are minimized
- The cost of health care services is reduced
Patients at Risk for Food-Nutrient Interactions

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

Food and Drug-Related Risk Factors

- Special diets
- Nutritional supplements
- Tube feeding
- Herbal or phytonutrient products
- Alcohol intake
- Drugs of abuse
Malnutrition Effect on Drugs

- Low albumin (protein) levels can make drugs more potent by increasing availability to tissues
  - Lower doses often recommended for persons with low albumin
  - Warfarin and phenytoin are highly protein bound in blood; ↓ albumin can result in poor seizure control (phenytoin) or hemorrhage (warfarin)
- Body composition: obese or elderly persons have a higher ratio of adipose tissue; fat-soluble drugs may accumulate in the body ↑ risk of toxicity

Food/Nutrient Effects on Drugs

Absorption
- Presence of food and nutrients in intestinal tract may affect absorption of drug
- Anti-osteoporosis drugs Fosamax or Actonel: absorption negligible if given with food; ↓ 60% with coffee or orange juice
Absorption

- Absorption of iron from supplements ↓↓ 50% when taken with food
- Best absorbed when taken with 8 oz of water on empty stomach
- Food may ↓↓ GI upset
- If taken with food, avoid bran, eggs, fiber supplements, tea, coffee, dairy products, calcium supplements

Absorption

- 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
Tetracycline Antibiotics

- Decrease calcium, magnesium, iron, Zinc, Vitamin B 6, Vitamin B 12, Beneficial intestinal bacteria
- Always take probiotics, after/during a round of antibiotics
- Be sure to eat a healthy diet to replete the needed nutrients

Food/Nutrient Effects on Drugs

- Absorption
  - Presence of food enhances the absorption of some medications
  - Bioavailability of Axetil (Ceftin), an antibiotic, is 52% after a meal vs 37% in the fasting state
Drug Effects on Nutrition; Absorption

- **Change GI environment**
  - Proton pump inhibitors (Nexium, Prevacid, Prilosec), H2 receptor antagonists (Pepcid, Zantac) inhibit gastric acid secretion, raise gastric pH; cimetidine (Tagamet) reduces intrinsic factor secretion; this *impairs* *B12 absorption*; ↑ pH may impair absorption of calcium, iron, zinc, folic acid, Vitamin D, magnesium and B-carotene

Food/Nutrient Effects on Drugs

- **Adsorption**: adhesion to a food or food component
  - High fiber diet may decrease the absorption of tricyclic antidepressants such as amitriptyline (Elavil)
  - Digoxin (Lanoxin) should not be taken with high phytate foods such as wheat bran or oatmeal
Drug Effects on Nutrition: Excretion

- Loop diuretics (furosemide, bumetanide) **increase excretion** of potassium, magnesium, sodium, chloride, calcium
  - Patients may need supplements with long term use, high dosages, poor diets
  - Electrolytes should be monitored

Drug Effects on Nutrition: Excretion

- Corticosteroids (prednisone) **decrease sodium excretion**, resulting in sodium and water retention; **increase excretion** of potassium and calcium
  - Low sodium, high potassium diet is recommended
  - Calcium and vitamin D supplements are recommended with long term steroid use (lupus, RA) to prevent osteoporosis
Drug Effects on Nutrition: **Adsorption**

- Cholestyramine (antihyperlipidemic bile acid sequestrant) clings to fat-soluble vitamins A, D, E, K, possibly folic acid; may need supplements for long term therapy, especially if dosed several times a day
- Mineral oil: (>2 tbsp/day) ↓ absorption of fat soluble vitamins
  - take vitamins at least 2 hours after mineral oil

Food/Nutrient Effects on Drugs: **GI pH**

- GI pH can affect drug absorption
- **Low stomach acid** can reduce absorption of ketoconazole – an antifungal
- Antacid medications can result in reduced acidity in the stomach
- Taking these meds with orange or cranberry juice can reduce stomach pH and increase absorption
Heartburn/GERD

- H2-receptor antagonists: Axid, Pepcid, Tagamet, Zantac **deplete** Vitamin B12, Folic Acid, Vitamin D, calcium, iron, zinc
- Proton pump inhibitors: Prilosec, Prevacid can **deplete** vitamin B12
- Stomach acid is first line defense against bacteria and microrganisms, helps digest protein

Food/Nutrient Effects on Drugs

Changes in diet may alter drug action

- Grapefruit/juice: inhibits the intestinal metabolism (cytochrome P-450 3A4 enzyme) of numerous drugs (calcium channel blockers, HMG CoA inhibitors, anti-anxiety agents) enhancing their effects and increasing risk of toxicity; may interfere with the absorption of other drugs
Grapefruit/juice

- The number of drugs on the market that react adversely with grapefruit has increased substantially in recent years — from 17 to 43.
- The list includes cholesterol-lowering statins such as Zocor and Lipitor and blood pressure medications such as Nifediac and Afeditab.

Grapefruit Inhibits Metabolism of Many Drugs

- Inactivates metabolizing intestinal enzyme resulting in enhanced activity and possible toxicity
- Effect persists for 72 hours so it is not helpful to separate the drug and the grapefruit
- Many hospitals and health care centers have taken grapefruit products off the menu entirely
Drugs known to interact with grapefruit juice

- Anti-hypertensives (filodipine, nifedipine, nimodipine, nicardipine, isradipine)
- Immunosuppressants (cyclosporine, tacrolimus)
- Antihistamines (astemizole)
- Protease inhibitors (saquinavir)
- Lipid-Lowering Drugs (atorvastatin, lovastatin, simvastatin)
- Anti-anxiety, anti-depressants (buspirone, diazepam, midazolam, triazolam, zaleplon, carbamazepine, clomipramine, trazodone)

Food/Nutrient Effects on Drugs

- Excretion
  - Patients on low sodium diets will *reabsorb* more lithium along with sodium; patients on high sodium diets will *excrete* more lithium and need higher doses
According to an April 2015 study by the IMS Institute for Healthcare Informatics, a company that tracks sales at the pharmacy level for drug companies, total drug spending in 2014 was $374 billion, up 13.1% from the prior year.

Most prescribed drugs?

- So which drugs are the most widely prescribed? That same IMS report shows that the top five medicines prescribed in the U.S. in 2014 were:
  - Levothyroxine
  - Hydrocodone/acetaminophen
  - Lisinopril
  - Metoprolol
  - Atorvastatin - Lipitor
### Common Food & Drug Interactions

<table>
<thead>
<tr>
<th>DRUG TYPE</th>
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<th>POTENTIAL FOOD INTERACTIONS</th>
</tr>
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<tbody>
<tr>
<td>Acid Blocker</td>
<td>Ranitidine (Zantac), cimetidine (Tagamet), famotidine (Pepcid), nizitidine (Axid)</td>
<td>Decreases vitamin B12, Folic Acid, Vitamin D, Calcium, Iron, Zinc absorption</td>
</tr>
<tr>
<td>Analgesic</td>
<td>Acetaminophen (Tylenol)</td>
<td>Alcohol increases risk for liver toxicity, decrease folic acid</td>
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<tr>
<td></td>
<td>Amoxicilin, penicillin, zithromax, erythromycin</td>
<td>Food decreases drug absorption, kills good bugs</td>
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<tr>
<td></td>
<td>Nitrofurantoin (Macrobid)</td>
<td>Food decreases GI distress, slows drug absorption</td>
</tr>
<tr>
<td>Anticonvulsant</td>
<td>Phenobarbital, barbituates</td>
<td>Alcohol causes increased drowsiness; vitamin C decreases drug effectiveness. Decreases Vitamins D, K, biotin, folic acid, calcium</td>
</tr>
<tr>
<td>Antifungal</td>
<td>Griseofulvin (Fulvicin)</td>
<td>High-fat meal increases absorption</td>
</tr>
<tr>
<td>Antihistamine</td>
<td>Diphenhydramine (Benadryl), chlorehphiramine (Chlor-Trimeton)</td>
<td>Alcohol increases drowsiness</td>
</tr>
<tr>
<td>Antihyperlipemic</td>
<td>Lovastatin (Mevacor)</td>
<td>Food enhances drug absorption, decreases CoQ10</td>
</tr>
<tr>
<td></td>
<td>Cholestyramine (Questran), colestipol (Colestid)</td>
<td>Decreases absorption of fat soluble vitamins A, D, E, K</td>
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<tr>
<td>Anti-inflammatory</td>
<td>Naproxen (Naprosyn)</td>
<td>Food or milk decreases GI irritation</td>
</tr>
<tr>
<td></td>
<td>Ibuprofen (Motrin)</td>
<td>Alcohol increases risk for liver damage and stomach bleeding</td>
</tr>
<tr>
<td>Antineoplastic</td>
<td>Methotrexate</td>
<td>Decreases absorption of folic acid and vitamin B12</td>
</tr>
<tr>
<td>Diuretic</td>
<td>Spironolactone (Aldactone)</td>
<td>Food decreases GI irritation</td>
</tr>
<tr>
<td></td>
<td>Furosemide (Lasix),</td>
<td>Increases mineral loss of urine</td>
</tr>
<tr>
<td></td>
<td>hydrochlorothiazide (HCTZ)</td>
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<td>Antiarrhythmic</td>
<td>Digoxin, Amiodarone, Pacerone</td>
<td>Avoid natural licorice, caution with aloe, hawthorne. Caution with calcium/vitamin D supplementation – can increase risk of arrhythmias. Avoid St.John’s wort</td>
</tr>
<tr>
<td>Anti-depressant</td>
<td>Tricyclic: amitryptiline, Elavil, Tofranil</td>
<td>Deplete vitamin B2, CoQ10. Limit caffeine. Avoid St. John’s wort</td>
</tr>
<tr>
<td></td>
<td>SSRI: Prozac, Zoloft</td>
<td>Depletes Melatonin. Avoid tryptophan, SJW</td>
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<tr>
<td>Laxative</td>
<td>Fibercon, Mitrolan</td>
<td>Decreases vitamin and mineral absorption</td>
</tr>
<tr>
<td>Psychotherapeutic</td>
<td>MAO inhibitors: isocarboxazid (Marplan), tranylcypromine (Parnate), phenelzine (Nardil)</td>
<td>Foods high in tyramine (aged cheese, Chianti wine, pickled herring, Brewer’s yeast, and fava beans) increase risk for hypertensive crisis</td>
</tr>
</tbody>
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### Calcium Channel Blockers
- Norvasc, Plendil, Procardia
- Limit caffeine. Avoid natural licorice, Depletes Vitamin D

### Loop Diuretics
- Lasix, Furosemide, Bumex
- Food decreases availability. Depletes Calcium, Potassium, Magnesium, Zinc, vitamins B1, B6, C

### Potassium-sparing diuretics

### ACE Inhibitors:
- Lisinopril, Altace, Accupril, Zestril, Prinivil
- Deplete Zinc. Avoid salt substitutes. Read package insert. Different drugs react differently with food, supplements
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<tr>
<td>Beta Blockers</td>
<td>Atenolol (Tenormin), Carvedilol (Coreg), Metoprolol (Lopressor, Toprol XL)</td>
<td>Avoid natural licorice; take 2 hours before or 6 hours after calcium supplements &amp;/or orange juice. Depletes CoQ10, Melatonin</td>
</tr>
<tr>
<td>Anti-Anginal</td>
<td>Norvasc, Procardia</td>
<td>Avoid natural licorice; depletes potassium, magnesium</td>
</tr>
<tr>
<td>Bile acid sequestrants</td>
<td>Questran, Colestid</td>
<td>Take before food. Depletes Vitamins A, D, E, K, B12, beta carotene, folic acid, calcium, iron, magnesium, zinc</td>
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<tr>
<td>OTC:</td>
<td>Aspirin</td>
<td>Depletes, Vitamin C, folic acid, iron, potassium</td>
</tr>
<tr>
<td>NSAIDs</td>
<td></td>
<td>Depletes Folic Acid</td>
</tr>
<tr>
<td>Female hormones</td>
<td>Estrogen, Premarin, Estrace, Climara</td>
<td>Vitamin B6, magnesium, folic acid, Vitamin B 12 zinc</td>
</tr>
<tr>
<td>Oral contraceptives</td>
<td></td>
<td>Vitamins B1, B2, B3, B6, B12, folic acid magnesium, zinc, selenium</td>
</tr>
</tbody>
</table>
Food/Nutrient Effects on Drug Action: Warfarin

- Warfarin (anticoagulant) acts by preventing the conversion of vitamin K to a usable form.
- Ingestion of vitamin K will allow production of more clotting factors, making the drug less effective.
- Must achieve a balance or steady state between dose of drug and consumption of vitamin K; recommend steady intake of K.
- Other foods with anticlotting qualities may also have an effect (garlic, onions, vitamin E in large amounts, and ginseng).

Warfarin (Coumadin)

- Keep levels of vitamin K foods consistent.
- Example 75 mcg per day.
- Broccoli, cooked, chopped, 1 cup = 220 mcg.
- Carrots, cooked, sliced, 1 cup = 21 mcg.
- Yellow bell pepper, 1 whole = 0 mcg.
- The Coumadin Cookbook by Rene Desmarais, MD, Greg Golden and Gail Beynon.
Cardiac Medications

- **Statins, HMG-CoA Reductase Inhibitors (Antihyperlipidemic)**
  - Simvastatin (Zocor), Rosuvastatin (Crestor), Atorvastatin (Lipitor)
  - **Common Use**
    - Used to lower LDL cholesterol and triglycerides, and raise HDL cholesterol
  - **Interaction**
    - Avoid alcohol, grapefruit juice and related citrus.
    - Do not take some with high doses of niacin
    - Separate fiber, pectin and oat bran from drug by several hours

Cardiac Medications

- **Vasodilators, also known as nitrates (Antihypertensive)**
  - Isosorbide dinitrate (Isordil), Nesiritide (Natrecor), Hydralazine (Apresoline), Nitrates and Minoxidil
  - **Common Use**
    - Used to ease chest pain (angina) by relaxing blood vessels and increasing blood supply to heart to help decrease its workload
  - **Interaction**
    - Limit alcohol
    - Decreased sodium and calcium intake may be recommended
    - Avoid natural licorice
Co-enzyme-Q10 Depletion

- Statin-induced Co-Q10 depletion impairs mitochondrial function, raising the serum lactate/pyruvate ratio
- Supplemental Co-Q10, 100-200 mg/day, prevents the decline in serum Co-Q10 levels without impairment of the lipid-lowering effects of statins and may reverse symptoms of statin myopathy

Coenzyme-Q10 Depletion

- Thiazides, some beta-blockers and many older psychotropic drugs have been shown to interfere with Co-Q10 dependent enzymes, creating a possible need for Co-Q10 supplementation in patients receiving them
Food/Nutrient Effects on Drug Action: **Caffeine**

- Increases adverse effects of stimulants such as amphetamines, methylphenidate, theophylline, causing nervousness, tremor, insomnia
- Counters the anti-anxiety effect of tranquilizers, anti-anxiety meds

Food/Nutrient Effects on Drug Action: **Alcohol**

- In combination with some drugs will produce additive *toxicity*
- With CNS-suppressant drugs may produce excessive drowsiness, may affect coordination
- Acts as gastric irritant; in combination with other irritants such as NSAIDs may increase chance of GI bleed
Food/Nutrient Effects on Drug Action: Alcohol

- Should not be combined with other hepatotoxic drugs such as acetaminophen, amiodarone, methotrexate
- Can inhibit gluconeogenesis when consumed in a fasting state; can prolong hypoglycemic episode caused by insulin or other diabetes meds

Food/Nutrient Effects on Drug Action: Alcohol

- Can produce life-threatening reaction when combined with disulfiram (Antabuse) which prevents the catabolism of ethanol by the liver
  - Causes nausea, headache, flushing, increased blood pressure
Thyroid Medications

- Levothyroxine, Synthroid, Levoxyl
- Take on empty stomach before breakfast (middle of night?)
- Take iron, calcium or magnesium supplements separately from drug by > 4 hours; may decrease absorption
- Soy, walnuts, high-fiber foods separate by > 4 hours also

Drugs That May Decrease Appetite

- Antiinfectives: antibacterials, antibiotics, antifungals, antiprotozoans and antivirals.
- Chemotherapy drugs
- Bronchodilators
- Cardiovascular drugs
- Stimulants
Drugs That May Increase Appetite

- Anticonvulsants
- Hormones
- Psychotropic drugs
  - Antipsychotics
  - Antidepressants, tricyclics, MAOIs

Drugs Affecting Oral Cavity, Taste and Smell

- **Taste changes**: cisplatin, captopril (antihypertensive) amprenavir (antiviral) phenytoin (anti-convulsive), clarithromycin (antibiotic)
- **Dry mouth**: Anticholinergic drugs (tricyclic antidepressants such as amitriptyline, antihistamines such as diphenhydramine, antispasmodics such as oxybutynin
Drugs that Affect the GI Tract

- Alendronate (Fosamax) anti-osteoporosis drug—patients must sit upright 30 minutes after taking it to avoid esophagitis
- Aspirin or other NSAIDs—can cause GI bleeding, gastritis
- Orlistat—blocks fat absorption, can cause oily spotting, fecal urgency, incontinence
- Narcotic agents cause constipation

Examples of Drug Classes That Cause Diarrhea

- Laxatives
- Antiretrovirals
- Antibiotics
- Chemotherapy drugs
- + liquid medications in elixirs containing sugar alcohols
Drugs That May Lower Glucose Levels

- Antidiabetic drugs (acarbose, glimepiride, glipizide, glyburide, insulin, metformin, miglitol, neteglinide, pioglitizone, repaglinide, rosiglitizone)
- Drugs that can cause hypoglycemia: ethanol (alcohol), quinine, insulin, disopyramide (antiarrhythmic)

Drugs That Raise Blood Glucose

- Antiretrovirals, protease inhibitors (amprenavir, nelfinavir, ritonavir, saquinavir)
- Diuretics, antihypertensives (furosemide, hydrochlorothiazide, indapamide)
- Hormones (corticosteroids, danazol, estrogen or estrogen/progesterone replacement therapy, megestrol acetate, oral contraceptives)
- Niacin (antihyperlipidemic) baclofen, caffeine, olanzapine, cyclosporine, interferon alfa-2a
Nutrition Implications of Excipients in Drugs

- **Excipients**: are inactive ingredients added to drugs as fillers, buffers, binders, disintegrants, flavoring, dye, preservative, suspending agent, coating
- Approved by FDA for use in pharmaceuticals
- Vary widely from brand to brand and formulation strengths of the same drug

Nutrition Implications of Excipients in Drugs

- Excipients may cause allergic or health reactions in persons with celiac disease, dye sensitivity, other allergies, inborn errors of metabolism
- Examples of excipients that might cause reactions are albumin, wheat products, alcohol, aspartame, lactose, sugar alcohols, starch, sulfites, tartrazine, vegetable oil
- Some meds may contain sufficient CHO or protein to put a patient on a ketogenic diet out of ketosis
Dye free options

- Lots of medications have food dye and color added to them
- If you are reactive to dye you can ask your doctor ahead of time to prescribe a dye free medication or go to a compounding pharmacy

Beneficial Drug-Supplement Interactions

- Reflect additive/complementary effects of supplements and drugs
  - Amelioration of toxic drug effects by supplements
- Fish oils enhance anti-inflammatory, anti-arrhythmic, anti-lipidemic and antidepressant effects
  - EPA and DHA may have differential effects
NSAIDs

- Nonsteroidal anti-inflammatory drugs
- 98 million prescriptions filled in 2012
- 23 million people in the U.S. use over-the-counter NSAIDs
- Aspirin (Bayer, Bufferin, Ecotrin, Excedrin)
- Celecoxib (Celebrex)
- Ibuprofen (Advil, Motrin, Naproxen sodium (Aleve))
- Rofecoxib (Vioxx)

NSAIDs can harm kidneys, GI tract, and cardiovascular system

- Patients with a first heart attack who took NSAIDs had a 41% increased risk of a second heart attack that persisted over 5 years compared with similar patients who did not take NSAIDs – study in *Circulation*, September 2012
NSAIDs

- Researchers found that all NSAIDs carried a cardiovascular risk but some were less harmful than others
- Naproxen (Aleve) had the lowest risk for MI
- Vioxx had the highest risk

Acetaminophen (Not NSAID) Toxicity

- Protective supplements for liver:
  - N-acetylcysteine NAC
  - L-methionine and SAMe
  - Milk Thistle

  - NAC can counteract liver damage that can result from chronic use of acetaminophen, which depletes the liver of glutathione
ASA/NSAID Gastropathy

- Protective supplements (human trials):
  - Vit C (500-1000 mg bid)
  - SAMe 500 mg/day
  - Cayenne 20 grams
  - Deglycyrrhizinated licorice 350 mg tid
  - Colostrum 125 mg tid
  - Peppermint (*Mentha piperita*)

Lower The Risk of Drug-Nutrient Interactions

- Tell your physician all the medications you are taking both prescription and over-the-counter
- Tell your physician and pharmacist about any new symptoms that develop when taking a medication
- Keep a list of all medications
- Ask if you have any questions
Questions To Ask Your Physician

- **What is the medication for?**
  - Medication name
  - Medication purpose

- **How should I take the medication?**
  - How often, how long
  - How to store
  - Recommendations on consuming food and/or beverages with medication

Questions To Ask Your Physician

- **What should I expect?**
  - Expected outcomes
  - Precautions
  - Side-effects
**Summary**

- Most drugs have nutritional status side effects
- Always look for therapeutically significant interactions between food and drugs
- Read your drug inserts and ask your doctor or pharmacist if you have any questions

**Resources**

- [www.pilladvised.com](http://www.pilladvised.com): online database where you can enter prescriptions along with dietary nutrients you take and see clinical studies documenting potential interactions, good and bad.
- By Leo Galland, MD, director of the Foundation for Integrated Medicine
- Natural Medicine Comprehensive Database [www.naturaldatabase.com](http://www.naturaldatabase.com) can search for medication depletion checker