



FOOD AND DRUG INTERACTION IS AN UNDERSTANDING BETWEEN DIETICIAN AND DOCTOR WITH PATIENT COMPLIANCES

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ABSTRACT

Perhaps the most common question patients ask about their medication, aside from "Why does this medication cost so much?" is, "Should I take this with or without food?" In most cases, upon looking in the package insert or drug information resource, the pharmacist discovers that most drugs in question may be administered without regard to meals. However, some food products are fortified with vitamins and/or minerals that can interact with certain drugs. Therefore, the more appropriate question to ask is, "Which foods should I avoid taking with my medications?" Furthermore, many patients consume mega-vitamins and supplements with known drug interactions, yet they are often unaware of these interactions. The purpose of this article is to equip pharmacists with a better understanding of drug-food interactions. This article differs from traditional reviews on this topic because the food substance is categorized individually, with the interacting drugs discussed under each heading. While there are hundreds of drug-nutrient interactions reported in the literature, the aim here is to focus on those that are more common and clinically significant. The effect of a drug on a person may be different since the drug may interact with another drug the person is taking (drug-drug interaction), food, beverages, dietary supplements the person is consuming (drug-nutrient/food interaction) or another disease the person has (drug-disease interaction). A drug interaction is a situation in which a substance affects the activity of a drug, i.e. the effects of the drugs are increased or decreased, or they produce a new effect that neither produces on its own. Physicians and pharmacists recognize that some drugs when taken simultaneously with some food can alter the body's ability to utilize a particular food or drug, or cause serious side effects. Pharmacists have a major role in preventing drug-food interaction. Therefore, it is advisable for patients to follow the physician and doctor's instructions to obtain maximum benefits with least food-drug interactions. This review gives information about various interactions between different foods and drugs which will help physicians and pharmacists to prescribe drugs cautiously with only suitable food supplement to get maximum benefit for the patient.

KEYWORDS: OTC (Over-The-Counter) drugs, Cardiovascular drugs, Diuretic drugs, Antibiotics, Antidiabetic drugs, Antiinflammatory drugs, Stimulants, Bronchodilators, Sedatives, Antiallergic drugs, GIT drugs.

INTRODUCTION

FOOD & DRUG both words are made of four letters. If anyone takes food (large quantity) and drug (least quantity) then it is harmful for body system because **food** will be in over eating and if anyone takes drug (large quantity) and food (least quantity) then it will be also harmful for body system because **drug** will be in overdose and will produce toxicological manifestations. In both cases a dietician selects which food has to be taken with which drug because *in-vivo* system produces food-drug interaction within the body system which will produce patient's discomfort. Food is permissible for body to supply macro/micro nutrients and drug is provided to control the malfunction of normal

biochemical system. In both cases food/drug both are xenobiotics (supplied from outer source) which is active in *in-vivo*. **Xeno** means outer source and **Biotics** means active in biological system. The active pharmaceutical ingredient (API) of drug supplies chemical entities obtained from either natural source or semisynthetic source or synthetic source having perfect structural network having capability to fit on bioreceptor platform having controlling authority to check the biochemical malfunction inside the body which creates disease and food is made of natural source having various macro and micro nutrients which are also chemical moieties having definite structural unit and having capability to supply nutrition to body to make it healthy. Specific molecule of

drug can interact with specific molecule of food which is understood by dietician followed by a medical practitioner (doctor) for the safety purpose of suffering of patient's ailments.

One of the most well known food–drug interactions is grapefruit juice and the HMG-CoA reductase inhibitors, more commonly known as statins. Grapefruit juice, in large quantities (32 oz. or more per day), can inhibit the cytochrome P450 3A4 (CYP3A4) enzyme and increase blood levels of drugs metabolized by this pathway, such as certain statin drugs. Note that this interaction applies to grapefruit juice, not the whole fruit itself. Furthermore, not all statins exhibit this interaction: Only atorvastatin (Lipitor), simvastatin (Zocor) and lovastatin

(Mevacor) are metabolized by the CYP3A4 isoform. Of these three statins, atorvastatin is least affected by grapefruit juice. Thus, the other statins, namely rosuvastatin (Crestor), pravastatin (Pravachol) and fluvastatin (Lescol), may be acceptable alternatives for patients who regularly consume large amounts of grapefruit juice. Underlying this interaction is the ability of some constituents of grapefruit juice to inhibit CYP3A4 in the intestine, thereby reducing the metabolism of the statins and increasing the drug's bioavailability. Thus, when large amounts of grapefruit juice are consumed in combination with these drugs, patients are at an increased risk of statin-related side effects, most notably, muscle toxicity, which may manifest as myalgia, myopathy, or rhabdomyolysis.^[1]



Figure 1: Food & Drugs.

While the statins receive the most public attention for their interaction with grapefruit juice, other drugs exhibit this same interaction. Calcium channel blockers are popular drugs that interact with grapefruit juice. All of the dihydropyridine calcium–blocking drugs, such as amlodipine (Norvasc), nifedipine (Procardia) and nicardipine (Cardene), as well as the non-dihydropyridine agent verapamil (Calan), interact with grapefruit juice. The calcium antagonist that is the most affected by the fruit juice is felodipine (Plendil), demonstrating as high as a 200% increase in the area under the curve (AUC) with co-administration. Diltiazem (Cardizem), although a substrate for CYP3A4 metabolism, does not show a substantial increase in serum concentrations due to grapefruit juice consumption. Nonetheless, pharmacists should warn patients to avoid drinking large volumes of grapefruit juice simultaneously with any calcium antagonist. Otherwise, patients may be at an increased risk of such side effects as orthostatic hypotension.

The phosphodiesterase inhibitors, sildenafil (Viagra), vardenafil (Levitra) and tadalafil (Cialis), used for erectile dysfunction, can also increase blood levels with concurrent use of grapefruit juice, but this interaction is unpredictable. While the clinical effects of the interaction are less pronounced than other classes of drugs, patients may have a slightly higher risk of adverse reactions, such as priapism, hypotension and visual disturbances. Estrogen-containing oral contraceptives are also affected by grapefruit juice; their serum levels increase only modestly when grapefruit juice is used concomitantly. Tricyclic antidepressants are affected by grapefruit juice because they are also substrates for

CYP3A4; clomipramine (Anafranil) is considered to be the most well-documented drug of this class to interact. Diazepam (Valium), temazepam (Restoril) and midazolam (Versed) are interacting agents of the benzodiazepine class that have increased concentrations and central nervous system depressant effects with grapefruit juice. However, other benzodiazepines (e.g., lorazepam, oxazepam) do not appear to be affected. Grapefruit juice doubles the oral systemic effects of budesonide (Entocort), increasing the risk of the already prevalent glucocorticoid effects. Buspirone levels and carbamazepine levels are increased with concurrent administration of grapefruit juice. Although ziprasidone levels can be elevated by concurrent consumption of grapefruit juice, other atypical antipsychotics do not appear to be affected. It is important to note that coadministration of grapefruit juice with the antiarrhythmic drug amiodarone can be problematic. The AUC of amiodarone was increased by 50% in 11 subjects when given with grapefruit juice (three 300-mL glasses on the day of amiodarone administration). However, amiodarone has an active metabolite that is also inhibited by grapefruit juice, making the net clinical effect of the interaction difficult to predict. Another potentially significant grapefruit juice interaction is with the immunosuppressant tacrolimus (Prograf). This drug is often used following organ transplantation. Due to the ability of grapefruit juice to inhibit the metabolism of tacrolimus, the manufacturer recommends avoiding the use of grapefruit juice during therapy.

Here is some of the most dangerous food-drug interactions that pharmacists can help prevent.



Figure-2: Fermented foods.

Red wine, Hard cheese, Chocolate, Aged cheese, Brewer's yeast, Yeast extracts, Pickled herring, Pickled, Cured, and Fermented Foods+**MAIOs**: This food category contains tyramine, which has been associated with a dangerous increase in blood pressure among patients taking monoamine oxidase inhibitors (MAIOs) and certain medications for Parkinson's disease.



Figure-3: Vitamin rich diet.

Vitamin K-Rich Foods (Broccoli, Brussels sprouts, cabbage, kale, spinach and other leafy greens)+**Warfarin**: Pharmacists should counsel patients taking warfarin to maintain a consistent intake of vitamin K and avoid introducing kale, spinach, and other leafy greens to their diets. Vitamin K is vital for the production of clotting factors that help prevent bleeding, but anticoagulants like warfarin exert their effect by inhibiting vitamin K. Therefore, an increased intake of the nutrient can antagonize the anticoagulant effect and prevent the drug from working. Warfarin is a blood-thinning medication that helps to treat and prevent blood clots. Consuming certain foods, especially those rich in vitamin K, can diminish warfarin's effectiveness.

Caffeine: Not only do foods affect the metabolism of drugs, but also in some cases, drugs interact with and alter the metabolism of food additives, such as caffeine. While it is appropriate to consider caffeine as a drug itself, rather than a food additive, some patients may disregard the fact that a high content of caffeine is found in coffee, tea, soft drinks, and other "energy" foods and beverages. Many common drugs interfere with the metabolism of caffeine, resulting in an increase in caffeine blood levels. Coffee+**Bronchodilators**: Stimulate the CNS and causes hyper-excitation. Consumption of caffeinated beverages late at night in combination with these medications may result in sleepless nights. In addition, this may enhance caffeine's

diuretic effect. Ciprofloxacin inhibits the metabolism of caffeine, resulting in increased effects of caffeine.^[2]



Figure-4: Stimulants.

The other fluoroquinolones do not appear to affect the metabolism of caffeine and may therefore be seen as alternatives for patients who consume large amounts of caffeine during the day. Cimetidine also increases caffeine levels, thus a different H₂ antagonist (e.g., ranitidine, famotidine) should be administered in caffeine users. Oral contraceptives and prednisone also increase caffeine levels due to the inhibition of caffeine metabolism. Conversely, caffeine inhibits the metabolism of theophylline, which shares a similar chemical structure with caffeine, and can increase the serum concentrations of theophylline.¹ Pharmacists should warn patients taking theophylline that caffeine-containing beverages may predispose patients to adverse theophylline-related effects, such as jitteriness, insomnia, and cardiac arrhythmia.



Figure-5: Wheat bran.

High-Fiber Diets (wheat bran)+**Digoxin (Digitalis, Digitek, Lanoxin)**: Digoxin is used to strengthen the contraction of the heart muscle, slow the heart rate, and promote the elimination of fluid from body tissues.

Dietary fiber can slow down the absorption of digoxin and lessen its effectiveness..



Figure-6: Black Licorice.

Black Licorice+Hypertensive drugs: Black liquorice contains glycyrrhiza which causes an irregular heartbeat or even death, when combined with digoxin. Black liquorice reduces the effectiveness of most blood pressure drugs, intensify the side effects of blood thinners and lower potassium levels when consumed with birth-control pills. **Natural Black Licorice (Glycyrrhiza):** According to Plogsted, glycyrrhiza — a natural ingredient used to make black licorice — can deplete the body of potassium while causing an increased retention of sodium. When the body is depleted of potassium, the activity of digoxin, a medication used to treat heart failure, can be greatly enhanced, resulting in the heart not beating properly. Glycyrrhiza can also decrease the effectiveness of high blood pressure medicines. And people taking Coumadin® (warfarin) should beware that glycyrrhiza can break down the drug, resulting in an increase in the body's clotting mechanism. Excessive amounts of natural licorice should be avoided when taking all of these medications. However, Plogsted notes that artificially-flavored black licorice doesn't contain glycyrrhiza and is not of concern.

Dairy Products/Calcium: In contrast to caffeine and grapefruit juice, the use of dairy products containing calcium may cause a chemical interaction, not a metabolic interaction. The calcium ion chelates with the drug and may decrease its absorption. Most pharmacists are familiar with the typical antacid and dairy product interactions. However, an increasing number of foods is being fortified with calcium. Orange juice, bread, and other foods enriched with calcium can result in the same type of interactions seen with calcium-containing antacids and dairy products. The fluoroquinolones (e.g., ciprofloxacin, levofloxacin) may be rendered ineffective when taken at the same time as dairy products or calcium supplementation. Most manufacturers suggest minimizing this interaction by administering an oral quinolone at least two hours before or six hours after the dose of an oral calcium supplement or calcium-rich food. Patients should be monitored for decreased therapeutic effects of oral quinolones if administered with oral calcium supplements. Tetracyclines also interact with concurrent administration of calcium and/or dairy products high in calcium. Bisphosphonates (alendronate, risedronate, and ibandronate) have low bioavailability,

and little drug is absorbed when given with any type of food or beverage other than water; this is especially problematic with dairy products. Levels of cefuroxime, a cephalosporin antibiotic, are decreased when taken with dairy products. Other cephalosporins do not appear to be affected. In addition, methotrexate levels are decreased with the consumption of milk-rich foods. As a general rule, administration of dairy products and/or calcium supplements should be separated from the interacting drug by at least two to four hours.^[3]



Figure-7: Calcium rich food.

Calcium-Rich Foods+Antibiotics: Dairy products such as milk, yogurt, and cheese can interfere with certain medications, including antibiotics such as Amoxicillin potassium clavulanate, Amoxicillin, Clindamycin, Metronidazole, Tetracycline, Cephalexin, Doxycycline, Levofloxacin and Ciprofloxacin. These antibiotics may bind to the calcium in milk, forming an insoluble substance in the stomach and upper small intestine that the body is unable to absorb.

Protein-Rich Foods: Protein-rich foods can interfere with or potentiate the absorption of various medications. Consuming a meal high in protein and taking propranolol concurrently can increase the beta-blocker's bioavailability. When propranolol was given with protein-rich foods, a mean increase in bioavailability of 53% was reported. Co-administration of protein and propranolol may increase such adverse events as bradycardia, hypotension, and, due to nonselectivity for beta-1 receptors, bronchoconstriction. High-protein diets can decrease concentration and efficacy of carbidopa/levodopa and theophylline, resulting in subtherapeutic conditions and exacerbation of conditions.



Figure-8: Grapefruit.

Grapefruit+Calcium Channel Blockers: Felodipine, Nifedipine, Nisoldipine, Amlodipine, Diltiazem, Bifedipine. Calcium channel blockers are prescribed for

high blood pressure. Grapefruit alters the breakdown of the calcium channel blockers, possibly results in excessively high blood levels of the drug along with an increased risk of serious side effects.

High-Fat Meals: Many drugs have their pharmacokinetics altered by fatty foods. Most drug monographs will list that maximum concentration is decreased, but total absorption remains the same. Due to the multitude of these medications and the variability observed, they are not discussed in this article. Some drugs have altered pharmacokinetics based on the fatty content of meals. For example, griseofulvin has a significantly increased absorption when taken with food, especially a high-fat meal. Thus, griseofulvin is recommended to be taken with a fatty meal to benefit from this interaction. However, this should be done on a consistent basis, and certain extended-release formulations may show increased "dose-- dumping" with fatty meals, whereas others do not.

Fiber: Fiber, much like calcium, works to bind drugs, resulting in decreased concentrations. For example, patients with diabetes who try to decrease their cholesterol levels by eating oatmeal after taking metformin might be worsening their diabetic control. Metformin blood levels are decreased when taken with large amounts of fiber. Levothyroxine is another drug that is altered when taken with fiber. Digoxin and penicillin are also affected by this food--drug interaction. However, other antibiotics in the penicillin class do not appear to be altered by the use of dietary fiber.^[4]

Vitamin C and Fruit Juices: Increasingly more fruit juices are fortified with vitamin C and other vitamins, if they do not contain them already. The absorption of amphetamine-containing drugs (e.g., Adderall) is altered, increased, or decreased if taken with acidic food or juices or vitamin C. Maximal absorption of amphetamines occurs in the intestinal alkaline environment. Acidic fruits or juices consumed concurrently with these drugs may impair gastrointestinal absorption. Foods that acidify the urine may increase renal clearance of amphetamines, leading to lower drug levels. In addition, fexofenadine levels are decreased when taken with fruit juices. Other second-generation antihistamines, such as cetirizine and loratadine, may be affected but not to the same extent as fexofenadine. One of the largest populations that take these medications--children (for attention-deficit hyperactivity disorder)--should avoid taking these drugs with apple or orange juice in the morning.

Tyramine-Containing Foods: Tyramine is a chemical found in foods and beverages such as cheese and red wine. It has a significant interaction with monoamine oxidase inhibitors (MAOIs). These drugs are used infrequently but are occasionally used to treat depression and are becoming increasingly popular for the treatment of Parkinson's disease. Linezolid, a newer oxazolidinone

antibiotic, has some MAOI properties, thus showing characteristics and potential for this interaction. Therefore, linezolid should be used cautiously in patients taking serotonin selective reuptake inhibitors (SSRIs). Lastly, isoniazid, a mainstay in the treatment of tuberculosis, also exhibits MAOI effects and should not be taken with tyramine-containing foods. High blood levels of the amino acid tyramine can cause an increase in blood pressure. Several medications interfere with the breakdown of tyramine, including monoamine oxidase inhibitors (MAOIs) which treat depression, and drugs used to treat the symptoms of Parkinson's disease. Plogsted advises those taking these drugs to steer clear of tyramine-rich foods. The list is lengthy and includes, but is not limited to: chocolate, aged and mature cheeses, smoked and aged/fermented meats, hot dogs, some processed lunch meats, fermented soy products and draft beers (canned and bottled beers are OK). When receiving a prescription for a new medication or taking a new over-the-counter drug, Plogsted advises consumers to always read drug warning labels and ask their physician and/or pharmacist about which foods or other drugs they should avoid or be concerned about taking. The foods we eat can interfere with the medications we take. Patients may not recognize that otherwise healthy foods can have severe consequences when mixed with certain drugs. As medication experts, pharmacists should recognize their responsibility to clearly communicate the risk of possible food-drug interactions for both prescription and OTC medicines.

Warfarin: Consistency is the key with warfarin in all circumstances. The most notorious food--drug interaction regarding warfarin occurs with "green, leafy vegetables" due to their rich vitamin K content. Warfarin, by its mechanism of action, interferes with the synthesis of vitamin K--derived clotting factors. Increasing vitamin K intake will result in more clotting factors, reducing the efficacy of warfarin. Some people erroneously believe that warfarin recipients cannot eat any green, leafy vegetables. However, if patients remain consistent with vitamin K intake, taking their medication as directed, the interaction is not substantial. Yet, when patients become vegetarians or avoid these foods completely after regular consumption, adverse events or changes in INR (international normalized ratio) occur. Soy milk, char grilled foods, and sushi containing seaweed may also decrease the effect of warfarin. Cranberry juice, in contrast, can significantly increase INR and potentiate the anticoagulant effects of warfarin.



Figure-9: Alcoholic beverages

Alcohol: While not a food per se, drug interactions with alcohol are numerous and important. The list of drugs that have sedating properties when used with alcohol is nearly endless. Some examples are benzodiazepines, antidepressants, barbiturates, antihistamines, opiates, muscle relaxants, antipsychotics, and anticonvulsants. When these drugs are taken concurrently with alcohol, patients are at an increased risk of ataxia, somnolence, respiratory depression, and motor impairment, which can lead to falls, accidents, and injury. Excessive use of acetaminophen with regular alcohol intake increases the risk of hepatotoxicity. Patients should be advised not to exceed 4 g of acetaminophen in 24 hours and consult their physician if they regularly drink three or more alcoholic drinks per day. A disulfiram reaction (facial flushing, vomiting, tachycardia) can occur if alcohol is ingested with drugs such as metronidazole, sulfonyleureas, or isoniazid. **Alcohol+Prescription Stimulants/NSAIDs:** Patients should always be wary of mixing any medication with alcohol, but some interactions are more serious than others. For instance, ingesting alcohol while taking a prescription stimulant could cause the patient to not fully realize how intoxicated they are. This is especially true when the stimulant is being abused, but it can also happen when the patient takes the drug as prescribed. It increase or prolongs the effects of insulin or oral diabetic agents (pills) and thus leads to hypoglycemia. Aspirin and Ibuprofen can't be taken with alcohol as stomach bleeding and serious damage to your liver.^[5]

Other Significant Interactions: Levothyroxine should not be taken with foods that may be goitrogenic. High sodium intake can decrease drug levels of lithium, and low sodium intake can increase levels of lithium; thus, consistency and moderation is important. In addition, patients with hypertension and those with heart failure should avoid sodium as much as possible, since it can exacerbate symptoms of both conditions. Colchicine and metformin decrease the absorption of vitamin B₁₂, which may have an impact in patients with certain types of anemia. Phenobarbital and corticosteroids decrease calcium absorption. As a result, patients on long-term corticosteroid treatment should have high levels of calcium supplementation, as well as a bisphosphonate for osteoporosis prevention. Lastly, patients taking an angiotensin-converting enzyme inhibitor or potassium-sparing diuretic (e.g., spironolactone or triamterene) should avoid excessive potassium intake, as these drugs already increase potassium levels in the body. You've probably heard the warnings not to drink grapefruit juice with cholesterol medication. However, that isn't the only combination of food and drugs to avoid. Grapefruit juice can interact with numerous other medications, both prescription and over-the-counter. And many other foods commonly interact with drugs, too. Steve Plogsted, BS, PharmD, BCNSP, CNSC, clinical pharmacist with Nutrition Support Service of Nationwide Children's Hospital in Columbus, Ohio, fills us in on five foods that most commonly interact with medications.

Grapefruit Juice: "Grapefruit juice has the ability to interact with medications in various ways," says Plogsted. One way is by increasing the absorption of certain drugs — as is the case with some, but not all, cholesterol-lowering statins. MedinePlus recommends avoiding grapefruit juice if you are taking statins. Grapefruit juice can also cause the body to metabolize drugs abnormally, resulting in lower or higher than normal blood levels of the drug. Many medications are affected in this way, including antihistamines, blood pressure drugs, thyroid replacement drugs, birth control, stomach acid-blocking drugs, and the cough suppressant dextromethorphan. It's best to avoid or significantly reduce intake of grapefruit juice when taking these medications. But why is grapefruit juice of concern and not other citrus juices? According to Plogsted, grapefruit juice contains a class of compounds called furanocoumarins, which act in the body to alter the characteristics of these medications. Orange juice and other citrus juices do not contain these compounds. There is some concern for Seville oranges and the pummelo, which are relatives of the grapefruit.



Figure-10: Grapefruit Juice

Grapefruit and Grapefruit Juice+Statins: Patients should avoid eating grapefruit or drinking grapefruit juice while taking some medications (Simvastatin, Lovastatin, Atorvastatin in particular statins). Compounds in grapefruit called furanocoumarin chemicals cause an increase in medication potency by interacting with enzymes in the small intestine and liver. This interaction partially inactivates a number of medications under normal circumstances. Statins are highly effective cholesterol-lowering drugs. Eating grapefruit or drinking grapefruit juice causes increase in medication potency by interacting with enzymes in the small intestine and liver.

Green Leafy Vegetables: Blood-thinning drugs such as Coumadin® (warfarin) interfere with vitamin K-dependent clotting factors. Eating too much green leafy vegetables, which are high in vitamin K, can decrease the ability of blood-thinners to prevent clotting. But you don't have to give up greens altogether. Problems arise from significantly and suddenly increasing or decreasing intake, as it can alter the effectiveness of the medicine. So eat your greens in consistent amounts.

Salt Substitutes: Consumers taking digoxin for heart failure or ACE inhibitors for high blood pressure should be careful with salt substitutes, which most often replace sodium with potassium. With an increased consumption

of potassium, the effectiveness of digoxin can be decreased, resulting in heart failure. And those taking ACE inhibitors might see a significant increase in blood potassium levels, as these drugs are known to increase potassium. "There is no real need to avoid salt substitutes, although care should be taken when using the product," say Plogsted. "If the consumer has decreased kidney function they should discuss the use of salt substitutes with their doctor."^[6]



Figure-11: Cinnamon.

Cinnamon+Anti-diabetics: This spice in large amounts can lower blood sugar which is similar to the action of diabetes drugs which results in dangerous lowering of blood sugar. A sprinkle of cinnamon in cooking is safe, but avoids consuming high-dose supplements.



Figure-12: Fish oil supplements.

Fish oil supplements+Blood thinners: Large amounts of fish oil also can thin the blood. Combined with these kinds of medications, this can pose a health risk.



Figure-13: Seafood.

Iodine-Rich Foods (seafood and seaweed, such as kelp and nori)+Antithyroid Drugs: Antithyroid drugs prevents iodine absorption in the stomach. A high-iodine diet requires higher doses of antithyroid drugs which

result in side effects that include rashes, hives, and liver disease.



Figure-14: Banana.

Bananas+ACE inhibitors: Ramipril, Captopril, Moexipril, Perindopril, Trandolapril, Benazepril/hctz, Lisinopril, Enalapril maleate, Fosinopril sodium, Quinapril hydrochloride these are avoided because high amounts of potassium can cause heart palpitations and an irregular heartbeat.^[7]



Figure-15: Walnuts.

Soybean flour, walnuts+Thyroid drugs such as levothyroxine (Levothroid, Levoxyl, Synthroid): These high-fiber foods can prevent one's body from absorbing the medications.



Figure-16: Apricots.

Potassium (bananas, apricots, coconut, dates, prunes, peaches, grapefruit, tomatoes, and oranges)+Spironolactone: Spironolactone, a potassium-sparing diuretic, in combination with foods high in potassium, could result in hyperkalemia.



Figure-17: Cow's milk.

Cow's milk+**Antitumor Drugs**: Xanthine Oxidase present in milk may potentially reduce bioavailability of mercaptopurine (antitumor drug).



Figure-18: High fat diets.

High fat meals+**Anti-fungal agents**: Griseofulvin (antifungal drug) has a significantly increased absorption when taken with high fat meals.



Figure-19: Oils.

Mineral oils+**Laxatives**: Overuse can cause a deficiency of vitamins A, D, E, and K.

What you eat and drink can affect the way your medicines work. A food-drug interaction can prevent a medicine from working the way it should, cause a side effect from a medicine to get worse or better, cause a new side effect. A medicine can also change the way your body uses a food. Any of these changes can be harmful. This article covers interactions between some common prescription and over-the counter medicines and food, caffeine, and alcohol. These interactions come from medicine labels that FDA has approved. This guide uses the generic names of medicines, never brand names.

What else can affect how my medicines work? Your age, weight, and sex; medical conditions; the dose of the medicine; other medicines and vitamins, herbals and other dietary supplements can affect how your medicines work. Every time you use a medicine, carefully follow the information on the label and directions from your doctor or pharmacist.

Does it matter if I take a medicine on a full or empty stomach? Yes, with some medicines. Some medicines can work faster, slower, better, or worse when you take them on a full or empty stomach. On the other hand, some medicines will upset your stomach and if there is food in your stomach, that can help reduce the upset. If you don't see directions on your medicine labels, ask your doctor or pharmacist if it is best to take your medicines on an empty stomach (one hour before eating,

or two hours after eating), with food, or after a meal (full stomach).

Does it matter if I take my medicine with alcohol? Yes, the way your medicine works can change when: (1) you swallow your medicine with alcohol (2) you drink alcohol after you've taken your medicine (3) you take your medicine after you've had alcohol to drink. Alcohol can also add to the side effects caused by medicines. You should talk to your doctor about any alcohol you use or plan to use.

How do I know if caffeine is in my food or drinks? Check the labels on your foods and drinks to see if they have caffeine. Some foods and drinks with caffeine are coffee, cola drinks, teas, chocolate, some high-energy drinks and other soft drinks.

Allergies: Antihistamines treat or relieve symptoms of colds and allergies, such as sneezing, runny nose, stuffy nose and itchy eyes. They block the histamine your body releases when a substance (allergen) causes the symptoms of an allergic reaction. Some antihistamines you can buy over-the counter and some you can buy only with a prescription from your doctor or other health care professional who can write a prescription. Some antihistamines can cause drowsiness. Examples: brompheniramine, cetirizine, chlorpheniramine, clemastine, desloratadine, diphenhydramine, fexofenadine, levocetirizine, triprolidine.

Interactions:

Alcohol: Avoid alcohol because it can add to any drowsiness caused by these medicines.

Arthritis, Pain and Fever: Analgesics/Antipyretics (Pain relievers/Fever reducers)

Analgesics/antipyretics relieve mild to moderate pain and lower fever. Examples: acetaminophen. Acetaminophen relieves mild to moderate pain from headaches, muscle aches, toothaches, backaches, menstrual cramps, the common cold, pain of arthritis and lowers fever.

Interactions

Alcohol: If you drink three or more alcoholic drinks every day, ask your doctor if you should use medicines with acetaminophen or other pain reliever/fever reducers. Acetaminophen can cause liver damage. The chance for severe liver damage is higher if you drink three or more alcoholic drinks every day.^[8]

Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)

NSAIDs relieve pain, fever, and inflammation. Some NSAIDs you can buy over-the-counter and some you can buy only with a prescription. The over-the-counter NSAIDs give short term relief from minor aches and pains from headaches, muscle aches, toothaches, backaches, menstrual cramps, and minor aches and pain of 6 arthritis. NSAIDs may be prescribed for conditions

such as osteoarthritis (arthritis caused by the breakdown of the lining of the joints). NSAIDs can cause stomach bleeding. Examples: aspirin, celecoxib, diclofenac, ibuprofen, ketoprofen, naproxen.

Interactions

Food: Take these medicines with food or milk if they upset your stomach.

Alcohol: If you drink three or more alcoholic drinks every day, ask your doctor if you should use medicines with NSAIDs or other pain relievers/fever reducers. NSAIDs can cause stomach bleeding and the chance is higher if you drink three or more alcoholic drinks every day.

Narcotic Analgesics: Narcotic analgesics treat moderate to severe pain. Codeine can also help you cough less. Some of these medicines are mixed with other medicines that aren't narcotics, such as acetaminophen, aspirin, or cough syrups. You can only buy narcotic analgesics with a prescription. Follow your doctor's or pharmacist's advice carefully because these medicines can be habit forming and can cause serious side effects if not used correctly.

Examples: codeine+acetaminophen, hydrocodone+acetaminophen, meperidine, morphine, oxycodone+acetaminophen.

Interactions

Alcohol: Don't drink alcohol while using narcotics. Alcohol can increase the chance of dangerous side effects, coma, or death.

Asthma

Bronchodilators

Bronchodilators treat and prevent breathing problems from bronchial asthma, chronic bronchitis, emphysema, and chronic obstructive pulmonary disease (COPD). These medicines relax and open the air passages to the lungs to relieve wheezing, shortness of breath, troubled breathing, and chest tightness. Take these medicines only as directed. If your symptoms get worse or you need to take the medicine more often than usual, you should talk to your doctor right away. Examples: albuterol, theophylline.

Interactions

Food: Food can have different effects on different forms of theophylline (some forms are regular release, sustained release and sprinkles). Check with your pharmacist to be sure you know which form of the medicine you use and if food can affect your medicine. Follow directions for sprinkle forms of the medicine. You can swallow sprinkle capsules whole or open them and sprinkle them on soft foods, such as applesauce or pudding. Swallow the mixture without chewing, as soon as it is mixed. Follow with a full glass of cool water or juice.

Caffeine: Using bronchodilators with foods and drinks that have caffeine can increase the chance of side effects, such as excitability, nervousness, and rapid heartbeat.

Alcohol: Avoid alcohol if you're using theophylline medicines because alcohol can increase the chance of side effects, such as nausea, vomiting, headache, and irritability.^[9]

Cardiovascular Disorders

These medicines prevent or treat disorders of the cardiovascular system, such as high blood pressure, angina (chest pain), irregular heartbeat, heart failure, blood clots, and high cholesterol. Some types of medicines can treat many conditions. For example, beta blockers can treat high blood pressure, angina (chest pain), and irregular heartbeats. ACE Inhibitors (Angiotensin Converting Enzyme Inhibitors) ACE inhibitors alone or with other medicines lower blood pressure or treat heart failure. They relax blood vessels so blood flows more smoothly and the heart can pump blood better. Examples: captopril, enalapril, lisinopril, moexipril, quinapril, ramipril.

Interactions

Food: Take captopril and moexipril one hour before meals. ACE inhibitors can increase the amount of potassium in your body. Too much potassium can be harmful and can cause an irregular heartbeat and heart palpitations (rapid heartbeats). Avoid eating large amounts of foods high in potassium, such as bananas, oranges, green leafy vegetables, and salt substitutes that contain potassium. They can raise the level of potassium even higher. Tell your doctor if you are taking salt substitutes with potassium, potassium supplements, or diuretics (water pills) because these can add to the amount of potassium in your body.

Beta Blockers Beta blockers can be used alone or with other medicines to treat high blood pressure. They are also used to prevent angina (chest pain) and treat heart attacks. They work by slowing the heart rate and relaxing the blood vessels so the heart doesn't have to work as hard to pump blood. Don't suddenly stop taking a beta blocker without talking to your doctor. If you stop a beta blocker suddenly, you can get chest pain, an irregular heartbeat, or a heart attack. Your doctor might tell you to decrease your dose gradually. Examples: carvedilol, metoprolol.

Interactions

Food: Take carvedilol with food to decrease the chance it will lower your blood pressure too much. Take carvedilol extended release capsules in the morning with food; don't crush, chew, or divide the capsule. Take metoprolol with a meal or right after a meal. Diuretics Sometimes called "water pills," diuretics help remove water, sodium, and chloride from the body. Diuretics reduce sodium and the swelling and excess fluid caused by some medical problems such as heart or liver disease.

Diuretics can also treat high blood pressure. Examples: bumetanide, furosemide, hydrochlorothiazide, metolazone triamterene, triamterene+ hydrochlorothiazide.

Interactions

Food: Take your diuretic with food if it upsets your stomach. Some diuretics cause loss of the minerals potassium, calcium, and magnesium from the body. Other diuretics, like triamterene (not with hydrochlorothiazide), lower the kidneys' ability to remove potassium, which can cause high levels of potassium in the blood stream (hyperkalemia). Too much potassium can be harmful and can cause an irregular or rapid beating of the heart. When you use diuretics that can increase potassium in your body, avoid eating large amounts of foods high in potassium, such as bananas, oranges, and green leafy vegetables, and salt substitutes that contain potassium. They can raise the level of potassium even higher. Tell your doctor if you are taking salt substitutes with potassium or potassium supplements because they can add to the amount of potassium in your body. Glycosides: Glycosides treat heart failure and abnormal heart rhythms. They help control the heart rate and help the heart work better. Example: digoxin.

Interactions

Food: Take digoxin one hour before or two hours after eating food. Try to take it at the same time(s) every day and carefully follow the label and directions from your doctor. Foods high in fiber may decrease the digoxin in your body, so take digoxin at least two hours before or two hours after eating foods high in fiber (such as bran). Avoid taking digoxin with senna and St. John's wort since they may decrease the amount and action of digoxin in your body. Avoid taking digoxin with black licorice (which contains the glycyrrhizin used in some candies, cakes and other sweets). Digoxin with glycyrrhizin can cause irregular heart beat and heart attack. Lipid-Altering Agents (also called Statins) Statins lower cholesterol by lowering the rate of production of LDL (lowdensity lipoproteins, or sometimes called "bad cholesterol"). Some of these medicines also lower triglycerides. Some statins can raise HDL-C (highdensity lipoproteins, or sometimes called "good cholesterol"), and lower the chance of heart attack, stroke, or small strokes. Examples: atorvastatin, fluvastatin, lovastatin, pravastatin, simvastatin, rosuvastatin, pravastatin simvastatin rosuvastatin.^[10]

Interactions

Food: You can take most statins on a full or empty stomach. Some statins will work better if you take them with an evening meal. Don't drink more than one quart of grapefruit juice a day if you are taking atorvastatin, lovastatin, or simvastatin. Large amounts of grapefruit juice can raise the levels of those statins in your body and increase the chance of side effects. Some statins don't interact with grapefruit juice. Ask your doctor or pharmacist if you have any questions. Alcohol: Avoid

alcohol because it can increase the chance of liver damage. Vasodilators-Nitrates Nitrates prevent or treat chest pain (angina). They work by relaxing the blood vessels to the heart, which improves the blood and oxygen flow to the heart. Examples: isosorbide dinitrate or mononitrate, nitroglycerin.

Interactions

Food: You can take all forms of nitrates on a full or empty stomach.

Alcohol: Avoid alcohol. Alcohol may add to the blood vessel-relaxing effect of nitrates and lead to a dangerously low blood pressure.

Vitamin K Agonists/Anticoagulants Anticoagulants are also called "blood thinners." They lower the chance of blood clots forming or growing larger in your blood or blood vessels. Anticoagulants are used to treat people with certain types of irregular heartbeat, people with prosthetic (replacement or mechanical) heart valves, and people who have had a heart attack. Anticoagulants also treat blood clots that have formed in the veins of the legs or lungs. Example warfarin Interactions Food: You can take warfarin on a full or empty stomach. Vitamin K in food can make the medicine less effective. Eat a normal balanced diet with a steady amount of leafy green vegetables, and talk to your doctor before making changes in your diet. Foods high in vitamin K include broccoli, cabbage, collard greens, spinach, kale, turnip greens, and brussel sprouts. Avoid cranberry juice or cranberry products while using anticoagulants because they can change the effects of warfarin. Many dietary supplements and vitamins can interact with anticoagulants and can reduce the benefit or increase the risk of warfarin. Avoid garlic, ginger, glucosamine, ginseng, and ginkgo because they can increase the chance of bleeding.

Alcohol: Tell your doctor and pharmacist if you drink alcohol or have problems with alcohol abuse. Avoid alcohol because it can affect your dose of warfarin.

Gastroesophageal Reflux Disease (GERD) and Ulcers Proton Pump Inhibitors Proton Pump Inhibitors (PPIs) work by decreasing the amount of acid made in the stomach. They treat conditions when the stomach produces too much acid. Some of these medicines you can buy over-the-counter to treat frequent heartburn, such as omeprazole and lansoprazole. Some of these medicines you can only buy with a prescription to treat conditions such as ulcers, gastroesophageal reflux disease, and to reduce the risk of stomach ulcers in people taking nonsteroidal antiinflammatory drugs (NSAIDs). Proton pump inhibitors are also used along with antibiotics to stop infections in the stomach that cause ulcers. Proton pump inhibitors come in different forms (such as delayed-release tablets, delayed-release disintegrating tablets, immediate release). Don't change your dose or stop using these without talking to your

doctor first. Examples: dexlansoprazole, esomeprazole, lansoprazole, omeprazole, pantoprazole, rabeprazole.

Interactions

Food: You can take dexlansoprazole and pantoprazole on a full or empty stomach. Esomeprazole should be taken at least one hour before a meal. Lansoprazole and omeprazole should be taken before eating. Ask your doctor or pharmacist how you should take rabeprazole. Tell your doctor if you cannot swallow delayed-release medicines whole because you shouldn't split, crush, or chew them. Some of these medicines can be mixed with food but you must carefully follow the label and directions from your doctor or pharmacist.

Hypothyroidism:

Hypothyroidism is a condition where the thyroid gland doesn't produce enough thyroid hormone. Without this hormone, the body cannot function properly, so there is poor growth, slow speech, lack of energy, weight gain, hair loss, dry thick skin, and increased sensitivity to cold.

Thyroid Medicines: Thyroid medicines control hypothyroidism but they don't cure it. They reverse the symptoms of hypothyroidism. Thyroid medicine is also used to treat congenital hypothyroidism (cretinism), autoimmune hypothyroidism, other causes of hypothyroidism (such as after thyroid surgery), and goiter (enlarged thyroid gland). It may take several weeks before you notice a change in your symptoms. Don't stop taking the medicine without talking to your doctor.

Example: levothyroxine.

Interactions Foods: Tell your doctor if you are allergic to any foods. Take levothyroxine once a day in the morning on an empty stomach, at least one-half hour to one hour before eating any food. Tell your doctor if you eat soybean flour (also found in soybean infant formula), cotton seed meal, walnuts, and dietary fiber; the dose of the medicine may need to be changed.

Infections

Be sure to finish all of your medicine for an infection, even if you are feeling better. All of the medicine is needed to kill the cause of infection. If you stop the medicine early, the infection may come back; the next time, the medicine may not work for the infection. Ask your doctor if you should drink more fluids than usual when you take medicine for an infection.

Antibacterials: Medicines known as antibiotics or antibacterials are used to treat infections caused by bacteria. None of these medicines will work for infections that are caused by viruses (such as colds and flu).

Quinolone Antibacterials: Examples: ciprofloxacin, levofloxacin, moxifloxacin.

Interactions: Food: You can take ciprofloxacin and moxifloxacin on a full or empty stomach. Take levofloxacin tablets on a full or empty stomach. Take levofloxacin oral solution one hour before eating or two hours after eating.

Don't take ciprofloxacin with dairy products (like milk and yogurt) or calcium-fortified juices alone, but you can take ciprofloxacin with a meal that has these products in it.

Caffeine: Tell your doctor if you take foods or drinks with caffeine when you take ciprofloxacin, because caffeine may build up in your body.

Tetracycline Antibacterials: Examples: doxycycline, minocycline, tetracycline.

Interactions

Food: Take these medicines one hour before a meal or two hours after a meal, with a full glass of water. You can take tetracycline with food if it upsets your stomach, but avoid dairy products (such as milk, cheese, yogurt, ice cream) one hour before or two hours after. You can take minocycline and some forms of doxycycline with milk if the medicine upsets your stomach.

Oxazolidinone Antibacterials: Example: linezolid

Interactions

Food: Avoid large amounts of foods and drinks high in tyramine while using linezolid. High levels of tyramine can cause a sudden, dangerous increase in your blood pressure. Follow your doctor's directions very carefully.

Foods with Tyramine

Foods that are spoiled or not refrigerated, handled, or stored properly, and aged, pickled, fermented, or smoked foods may contain tyramine. Some of these are:

- cheeses, especially strong, aged, or processed cheese, such as American processed, cheddar, colby, blue, brie, mozzarella, and parmesan cheese; yogurt; sour cream (you can eat cream and cottage cheese)
- beef or chicken liver, dry sausage (including Genoa salami, hard salami, pepperoni, and Lebanon bologna), caviar, dried or pickled herring, anchovies, meat extracts, meat tenderizers and meats prepared with tenderizers
- avocados, bananas, canned figs, dried fruits (raisins, prunes), raspberries, overripe fruit, sauerkraut, soy beans and soy sauce, yeast extract (including brewer's yeast in large quantities)
- broad beans (fava)
- excessive amounts of chocolate

Caffeine: Many foods and drinks with caffeine also contain tyramine. Ask your doctor if you should avoid or limit caffeine. **Alcohol:** Avoid alcohol while using linezolid. Many alcoholic drinks contain tyramine, including tap beer, red wine, sherry, and liqueurs. Tyramine can also be in alcohol-free and reduced alcohol beer.

Metronidazole Antibacterials.

Example: metronidazole.

Interactions: Alcohol: Don't drink alcohol while taking metronidazole and for at least one full day after finishing the medicine; together alcohol and metronidazole can cause nausea, stomach cramps, vomiting, flushing, and headaches.

Antifungals: Antifungals are medicines that treat or prevent fungal infections. Antifungals work by slowing or stopping the growth of fungi that cause infection. Examples: fluconazole, itraconazole, posaconazole, voriconazole, griseofulvin, terbinafine.

Interactions Food: Itraconazole capsules will work better if you take it during or right after a full meal. Itraconazole solution should be taken on an empty stomach. Posaconazole will work better if you take it with a meal, within 20 minutes of eating a full meal, or with a liquid nutritional supplement. Don't mix voriconazole suspension with any other medicines, water, or any other liquid.

Griseofulvin works better when taken with fatty food. You can take the rest of the antifungals listed here on a full or empty stomach. Alcohol: Avoid alcohol while you are taking griseofulvin because griseofulvin can make the side effects of alcohol worse. For example, together they can cause the heart to beat faster and can cause flushing.

Antimycobacterials

Antimycobacterials treat infections caused by mycobacteria, a type of bacteria that causes tuberculosis (TB), and other kinds of infections.

Examples: ethambutol, isoniazid, rifampin, rifampin+isoniazid, rifampin+isoniazid+pyrazinamide.

Interactions

Food: Ethambutol can be taken with or without food. Take the rest of these medicines one hour before a meal or two hours after a meal, with a full glass of water. Avoid foods and drinks with tyramine and foods with histamine if you take isoniazid alone or combined with other antimycobacterials. High levels of tyramine can cause a sudden, dangerous increase in your blood pressure. Foods with histamine can cause headache, sweating, palpitations (rapid heart beats), flushing, and hypotension (low blood pressure). Follow your doctor's directions very carefully. Foods with histamine include skipjack, tuna, and other tropical fish.

Caffeine: Many foods and drinks with caffeine also contain tyramine. Ask your doctor if you should avoid or limit caffeine.

Alcohol: Avoid alcohol. Many alcoholic drinks contain tyramine, including tap beer, red wine, sherry, and liqueurs. Tyramine can also be in alcohol-free and reduced alcohol beer. If you drink alcohol every day

while using isoniazid you may have an increased risk of isoniazid hepatitis.

Antiprotozoals: Antiprotozoals treat infections caused by certain protozoa (parasites that can live in your body and can cause diarrhea). Examples: metronidazole, tinidazole.

Interactions

Alcohol: Together alcohol and these medicines can cause nausea, stomach cramps, vomiting, flushing, and headaches. Avoid drinking alcohol while taking metronidazole and for at least one full day after finishing the medicine. Avoid drinking alcohol while taking tinidazole and for three days after finishing the medicine.

Psychiatric Disorders: Depression, bipolar disorder, general anxiety disorder, social phobia, panic disorder, and schizophrenia are a few examples of common psychiatric (mental) disorders. Use the amount of medicine that your doctor tells you to use, even if you are feeling better. In some cases it can take several weeks before you see your symptoms get better. Don't stop these medicines until you talk to your doctor. You may need to stop your medicine gradually to avoid getting side effects. Some of these medicines can affect your thinking, judgment, or physical skills. Some may cause drowsiness and can affect how alert you are and how you respond. Don't do activities like operating machinery or driving a car, until you know how your medicine affects you.

Anti-Anxiety and Panic Disorder Medicines

Examples: alprazolam, clonazepam, diazepam, lorazepam

Anti-Anxiety and Panic Disorder Medicines. Examples: alprazolam clonazepam diazepam lorazepam

Interactions: Alcohol: Avoid alcohol. Alcohol can add to the side effects caused by these medicines, such as drowsiness.

Antidepressants: Antidepressants treat depression, general anxiety disorder, social phobia, obsessive-compulsive disorder, some eating disorders, and panic attacks. The medicines below work by increasing the amount of serotonin, a natural substance in the brain that helps maintain mental balance. Never stop an antidepressant medicine without first talking to a doctor. You may need to stop your medicine gradually to avoid getting side effects.

Examples: citalopram, escitalopram, fluoxetine, paroxetine, sertraline.

Interactions

Food: You can take these medicines on a full or empty stomach. Swallow 26 paroxetine whole; don't chew or crush it. Alcohol: Avoid alcohol. Alcohol can add to the side effects caused by these medicines, such as drowsiness.

Antidepressants-Monoamine Oxidase Inhibitors: (MAOIs) MAOIs treat depression in people who haven't been helped by other medicines. They work by increasing the amounts of certain natural substances that are needed for mental balance. Examples: phenelzine, tranylcypromine.

Interactions

Food: Avoid foods and drinks that contain tyramine when you use MAOIs. High levels of tyramine can cause a sudden, dangerous increase in your blood pressure. Follow your doctor's directions very carefully.

Alcohol: Don't drink alcohol while using these medicines. Many alcoholic drinks contain tyramine, including tap beer, red wine, sherry, and liqueurs. Tyramine also can be in alcohol-free and reduced alcohol beer. Alcohol also can add to the side effects caused by these medicines.

Antipsychotics: Antipsychotics treat the symptoms of schizophrenia and acute manic or mixed episodes from bipolar disorder. People with schizophrenia may believe things that are not real (delusions) or see, hear, feel, or smell things that are not real (hallucinations). They can also have disturbed or unusual thinking and strong or inappropriate emotions. These medicines work by changing the activity of certain natural substances in the brain.

Examples: aripiprazole, clozapine, olanzapine, quetiapine, risperidone, ziprasidone.

Interactions

Food: Take ziprasidone capsules with food. You can take the rest of these medicines on a full or empty stomach.

Caffeine: Avoid caffeine when using clozapine because caffeine can increase the amount of medicine in your blood and cause side effects.

Alcohol: Avoid alcohol. Alcohol can add to the side effects caused by these medicines, such as drowsiness.

Sedatives and Hypnotics (Sleep Medicines): Sedative and hypnotic medicines treat people who have problems falling asleep or staying asleep. They work by slowing activity in the brain to allow sleep. Some of these medicines you can buy over-the-counter and some you can only buy with a prescription. Tell your doctor if you have ever abused or have been dependent on alcohol, prescription medicines, or street drugs before starting any sleep medicine. You could have a greater chance of becoming addicted to sleep medicines. Examples: eszopiclone, zolpidem.

Interactions

Food: To get to sleep faster, don't take these medicines with a meal or right after a meal. **Alcohol:** Don't drink

alcohol while using these medicines. Alcohol can add to the side effects caused by these medicines.

Bipolar Disorder Medicines: People with bipolar disorder experience mania (abnormally excited mood, racing thoughts, more talkative than usual, and decreased need for sleep) and depression at different times during their lives. Bipolar disorder medicines help people who have mood swings by helping to balance their moods. Examples: carbamazepine, divalproex sodium, lamotrigine lithium.

Interactions

Food: Take divalproex with food if it upsets your stomach. Take lithium immediately after meal or with food or milk to avoid stomach upset. Lithium can cause you to lose sodium, so maintain a normal diet, including salt; drink plenty of fluids (eight to 12 glasses a day) while on the medicine.

Alcohol: Avoid alcohol. Alcohol can add to the side effects caused by these medicines, such as drowsiness.

Osteoporosis: Bisphosphonates (bone calcium phosphorus metabolism): Bisphosphonates prevent and treat osteoporosis, a condition in which the bones become thin and weak and break easily. They work by preventing bone breakdown and increasing bone thickness.

Examples: alendronate sodium, alendronate sodium+cholecalciferol, ibandronate sodium, risedronate sodium, risedronate sodium+calcium carbonate

Food: These medicines work only when you take them on an empty stomach. Take the medicine first thing in the morning with a full glass (six to eight ounces) of plain water while you are sitting or standing up. Don't take with mineral water. Don't take antacids or any other medicine, food, drink, calcium, or any vitamins or other dietary supplements for at least 30 minutes after taking alendronate or risedronate, and for at least 60 minutes after taking ibandronate. Don't lie down for at least 30 minutes after taking alendronate or risedronate and for at least 60 minutes after taking ibandronate. Don't lie down until you eat your first food of the day.

More About Using Medicines Safely Read the label before you use any medicine. Over-the-counter medicine has a label called Drug Facts on the medicine container or packaging. The label is there to help you choose the right medicine for you and your problem and use the medicine safely. Some over-the-counter medicines also come with a consumer information leaflet which gives more information. **Prescription Medicines Medication Guide (also called Med Guide):** This is one kind of information written for consumers about prescription medicines. The pharmacist must give you a Medication Guide each time you fill your prescription when there is one written for your medicine. Medication

Guides are made for certain medicines that have serious risks. The information tells about the risks and how to avoid them. Read the information carefully before you use the medicine. If you have any questions, ask a doctor or pharmacist.^[11]

CONCLUSION

As evidenced by all of the interactions discussed, it appears that the safest thing to take medications with, unless clearly known otherwise, is a large glass of water. Fat diets may bring new interactions that are unknown. For example, pomegranate juice is becoming increasingly popular and has shown implications of inhibiting CYP3A4, similar to grapefruit juice. Thus far, no drug interactions have been directly linked to it, but the juice should be considered as a potential offender. Whenever possible, pharmacists should discuss drug administration instructions with each patient. In cases where certain foods or beverages are known to impact therapy, the pharmacist should determine the clinical relevance, if any, and advise patients appropriately. Many drugs also interact with alcohol, herbal therapy, and dietary supplements. Thus, it is important for the pharmacist to take a thorough dietary history to determine if patients need additional counsel about medication administration.

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