Common Drug Classes, Drug-Nutrient Depletions, & Drug-Nutrient Interactions

Pharmavite

Purpose: For educational use by healthcare professionals only.

Disclaimer: People taking prescription drugs may be more likely to have reduced levels of certain nutrients. Low nutrient levels may lead to other problems. Prescriptions are important to the consumer's health and will function without the recommended dietary supplements. The dietary supplements mentioned here are not intended to replace prescription drugs. It is important to advise consumers to consult with their healthcare provider before beginning a dietary supplement regimen.

DND = Drug Nutrient Depletion

General Recommendation for all Categories: Daily Multivitamin

DRUG CATEGORY	Drug Category Brief Description	Drug-Induced Nutrient Depletions	Additional Suggested Supplements for Nutritional Support*	Dietary Supplements that have Potential for Interactions with Drug (or Drug Class)**
1. ACID-SUPPRESSING DRUGS and ANTACIDS	1. H2 antagonists block histamine (H2) receptors on gastric mucosal cells and decrease the production and secretion of acid. 2. Proton-Pump Inhibitors block the acid transporter pump on the luminal surface preventing acid from entering the gastric lumen. 3. Antacids directly neutralize existing acid in the stomach.	**DND:** **H2 antagonists deplete calcium, folic acid, iron, vitamin B_{12}, and vitamin D.** **Proton-pump inhibitors deplete magnesium and vitamin B_{12}.** **RECOMMENDED SUPPLEMENTATION:** • **H2 antagonists and proton-pump inhibitors:** * **Vitamin B_{12}: 25–1000 mcg/day** * **Magnesium: 250–400 mg/day** * **Calcium: 500 -1000 mg/day**	Iron[a]: discuss with healthcare provider. Vitamin D[b]: 25-50 mcg (1000-2000 IU) /day Vitamin C - with *H. pylori* [c]: 250-500 mg/day Zinc[d]: 15 mg/day	**Goldenseal and Ginger:** These supplements may increase stomach acid and thus might interfere with antacids, H2 antagonists, and proton pump inhibitors. **Green Tea:** Tagamet® (cimetidine) can inhibit the metabolism of caffeine in green tea and significantly reduce its clearance.
2. ANTIBIOTICS	Antibiotics are used to treat bacterial infections.	**DND:** **Antibiotics deplete calcium, magnesium, potassium as well as certain B vitamins (B_1-thiamin, B_2-riboflavin, B_3-niacin, B_5-pantothenic acid, B_6, B_9-folic acid, B_{12}) and vitamin K.** **RECOMMENDED SUPPLEMENTATION:** • **Calcium: 500–1000 mg/day in divided doses** • **Magnesium: 250–400 mg/day**		**Calcium, Iron, Magnesium, and Zinc:** When taken concurrently with antibiotics, absorption of both can be affected due to formation of insoluble complexes. **Green Tea Catechins:** Certain antibiotics (fluoroquinolones) reduce clearance of some green tea constituents (caffeine and theophylline) and may increase the risk of their side effects: nervousness, palpitations, and insomia. **St. John's wort:** It causes photosensitivity and may exacerbate the photosensitizing effects of certain antibiotics.
3. ANTIDEPRESSANTS *(continued page 2)*	This class of medications increases the levels of one or more of the biogenic amines (e.g. norepinephrine, serotonin, dopamine) in the central nervous system. Clinical improvement from antidepressant therapy generally takes 3–6 weeks.		Calcium[e]: 500-1000 mg/day Vitamin D[e]: 25-50 mcg (1000-2000 IU) /day Folic acid[f]: 240 mcg/day	**Melatonin:** Melatonin may interact with medications that inhibit serotonin reuptake including a number of antidepressant medications. Endogenous melatonin levels are reduced by SSRI medications.

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3. ANTIDEPRESSANTS *(continued from page 1)*				**SAM-e:** Studies suggest SAM-e may augment the actions of anti-depressant drugs in individuals who are refractory to, or do not get full remission from their anti-depressants. **St. John's wort and 5-HTP:** St. John's wort and other supplements such as 5-HTP, in combination with drugs that increase CNS serotonin levels, can increase the risk of serotonergic side effects, including serotonin syndrome.
4. ANTIEPILEPTICS (Anticonvulsants)	These drugs work by decreasing the firing of aberrant neurons in the brain and/or decreasing the spread of abnormal activity to the surrounding regions of the brain.		Calcium[g]: 500 mg/day Vitamin D[g]: 25–50 mcg (1000–2000 IU) /day Vitamin B_{12}[h]: 25–1000 mcg/day	Use caution with the following supplements since they may interfere with the effectiveness of antiepileptic drugs. **Folic acid** **Gingko biloba** **Niacin** **St. John's wort**
5. ANTIPSYCHOTICS *(continued page 3)*	Antipsychotics block receptors for neurotransmitters (i.e. dopamine, serotonin). They can reduce the symptoms of schizophrenia, decrease agitation and/or aggression associated with other psychiatric conditions and may stabilize mood in bipolar disease.	**DND:** **Vitamin B_2 (Riboflavin)** **RECOMMENDED SUPPLEMENTATION:** • **Daily Multivitamin** • **B Vitamins**	Vitamin C[i]: 250–500 mg/day	**Echinacea:** Echinacea may inhibit the human drug metabolizing enzyme CYP1A2 leading to decreased clearance (increased blood levels) of Zyprexa®, and this increases potential for side effects. **Evening Primrose Oil:** Seizures have been reported in people with schizophrenia treated concomitantly with phenothiazine drugs and evening primrose oil. **Ginkgo biloba:** Ginkgo has been report to cause seizures or lower seizure threshold. Thus, in combination with drugs that lower seizure threshold (including antipsychotics), there may be a significant increase in risk of seizures. **Ginseng:** Ginseng may exacerbate some psychiatric conditions including hysteria, mania, and schizophrenia and thus compromise the therapeutic benefit of antipsychotics. It may also inhibit some of the drug metabolizing enzymes responsible for clearance of antipsychotic drugs.

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5. ANTIPSYCHOTICS *(continued from 3)*				**Goldenseal:** Goldenseal can inhibit cytochrome P450 2D6 (CYP2D6) and might affect effectiveness of several antipsychotics as well as impact potential for side effects. **St. John's wort:** St. John's wort in combination with antipsychotic drugs may lead to unpredictable effects. It is also known to cause photosensitivity and this risk may be increased in combination with certain antipsychotics (phenothiazines), which also can cause photosensitivity.
6. ANXIETY MEDICATION (Benzodiapezines)	Benzodiazepines are a class of drugs primarily used to treat anxiety.	**DND:** **Calcium** **These medications decrease calcium absorption by increasing metabolism of vitamin D, which is needed for calcium absorption.** **RECOMMENDED SUPPLEMENTATION:** • **Calcium: 500–1000 mg/day in divided doses**	Melatonin[j]: 1–3 mg/day	**Kava:** The combination of kava and benzodiazepines is not recommended due to their similar effects.
7. BIRTH CONTROL (Oral Contraceptives)	Synthetic and semi-synthetic analogs of estrogen and/or progesterone are used to prevent pregnancy by (1) inhibiting ovulation, (2) thickening cervical mucus and/or (3) diminishing endometrial integrity.	**DND:** **Folic acid** **Magnesium** **Vitamin B_6** **RECOMMENDED SUPPLEMENTATION:** • **Folic acid: 240 mcg/day** • **Magnesium: 250–400 mg/day** • **Vitamin B_6: 2-5 mg/day**	Calcium[k]: 500 mg/day Vitamin B12[l]: 25–1000 mcg/day	**Copper and Iron:** Oral contraceptives may increase serum copper and iron levels. **Garlic and St. John's wort:** Garlic and St. John's wort supplements may decrease effectiveness of oral contraceptives. St. John's wort also causes photosensitivity which may be exacerbated by oral contraceptives. **Green Tea:** Use caution with green tea and oral contraceptives. Oral contraceptives can decrease caffeine clearance by 40–65% and may increase adverse effects of caffeine in green tea. Adjust dose or discontinue if necessary.

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8. BLOOD PRESSURE MEDICATION (Anti-hypertensives)	The major classes of anti-hypertensive drugs include: ACE inhibitors, ARBs, beta blockers, and calcium channel blockets. These drugs help reduce blood pressure by either decreasing total peripheral resistance, or cardiac output or both.	**DND:** **Beta blockers can deplete CoQ10** **ACE inhibitors deplete zinc.** **Calcium channel blockers deplete potassium.** **Other DNDs and Recommended Supplementation** • **Calcium: 500 – 1000 mg/day** • **Folic acid: 120-240 mcg/day** • **Magnesium: 250-400 mg/day** • **CoQ10[m]: 100–200 mg/day** **RECOMMENDED SUPPLEMENTATION:** • **ACE inhibitors- Zinc: 15 mg/day** • **Calcium channel blockers-Potassium: ≤ 100 mg/day**	Iron[n]: Take as directed by healthcare provider	**Calcium** (with calcium channel blockers only)**:** Calcium supplements may interfere with the blood pressure lowering activity of these drugs. **CoQ10 and Fish Oil:** These supplements may decrease blood pressure in combination with anti-hypertensive drugs. Monitor blood pressure regularly. **Garlic, Ginkgo biloba & St. John's wort:** These supplements have the potential to interfere with the cytochrome P450 system and therefore affect the metabolism and/or clearance of drugs. **Green Tea and Goldenseal:** These supplements may affect therapeutic benefits of anti-hypertensive drugs. **Melatonin:** Melatonin may impair the efficacy of some calcium channel blockers. Monitor for changes in therapeutic efficacy and adjust doses as necessary and/or avoid use of melatonin with this drug class. **Potassium** (with ACE inhibitors and ARBs only)**:** Taking these drugs along with potassium supplements increases risk for hyperkalemia due to a decrease in renal potassium excretion. **Vitamin D:** Vitamin D supplements interfere with the activity of a calcium channel blocker (verapamil).
9. BLOOD THINNING MEDICATION (Anticoagulants/Antiplatelets) *(continued page 5)*	1. Anticoagulants decrease the potential for clotting via the Prothrombin-Thrombin-Fibrinogen cascade. 2. Antiplatelets decrease potential for clots as a result of impacting platelet aggregation.			Use caution with the following supplements as they may increase effectiveness of medication and potentially increased risk of bleeding. **Bilberry** **Cod Liver Oil** **Dong Qual** **Evening Primrose Oil** **Feverfew** **Fish Oil** **Flaxseed Oil** **Garlic** **Ginger Root** **Ginkgo biloba** **Ginseng** **Glucosamine** **Goldenseal** **Grape Seed Extract** **Green Tea** **Horse Chestnut** **Milk Thistle** **Saw Palmetto** **Vitamin C** **Vitamin E**

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9. BLOOD THINNING MEDICATION (Anticoagulants/Antiplatelets) *(continued from page 4)*				**Vitamin K:** People taking anticoagulant medications should maintain consistent amount of vitamin K from their diet and supplement regimen, while avoiding fluctuations in intake or large doses of vitamin K. **Coenzyme Q10 (CoQ10):** CoQ10 is structurally similar to vitamin K and my interfere with effectiveness of anticoagulants.
10. CHOLESTEROL LOWERING MEDICATION (Statins)	Statins inhibit the HMG CoA reductase enzyme–a key step in the hepatic synthesis of cholesterol. The reduction of cholesterol synthesis subsequently increases the liver's removal of circulating LDL cholesterol. Note: HMG CoA reductase is also a key enzyme in the synthesis of coenzyme Q10 (CoQ10)	**DND:** **CoQ10** **Vitamin A** **Vitamin D** **Vitamin E** **RECOMMENDED SUPPLEMENTATION:** • **CoQ10: 100–200 mg/day** • **Vitamin D: 25-50 mcg (1000-2000 IU) /day**	Daily Multivitamin/mineral supplement Fish Oil: 500–1000 mg EPA + DHA/day	**Garlic (containing allicin) and St. John's wort:** These supplements may impact cytochrome P450 metabolism of some statins and affect their effectiveness. **Red Yeast Rice:** Red yeast rice contains lovastatin which also lowers blood cholesterol levels. This supplement should not be taken with cholesterol-lowering drugs unless under the supervision of healthcare professional. **Vitamin A:** Long term use of cholesterol lowering drugs may increase vitamin A levels in the blood. Vitamin A levels may need to be monitored in some individuals.
11. CORTICOSTEROIDS	Corticosteroids are synthetic compounds that mimic the effects of hormones naturally produced in the body by adrenal glands. They are known for relieving inflammation, pain and discomfort resulting from various health conditions	**DND:** **Calcium** **Vitamin D** **Magnesium** **Potassium** **Chromium** **RECOMMENDED SUPPLEMENTATION:** • **Calcium: 500 mg/day** • **Vitamin D: 25–50 mcg (1000–2000 IU) /day** • **Magnesium: 250–400 mg/day** • **Potassium: ≤100 mg/day** • **Chromium: 50 - 200 mcg/day**		Use caution with the following supplements as they may interact with and/or affect effectiveness of medication. **Herbal Supplements** **Licorice** **St. John's wort**
12. DIABETES MEDICATION (Oral Hypoglycemics)		**DND:** **Folic acid** **Vitamin B_{12}** **Calcium** **Vitamin D** **RECOMMENDED SUPPLEMENTATION:** • **Folic acid: 120–240 mcg/day** • **Vitamin B_{12}: 25–1000 mcg/day** • **Calcium: 500 mg/day** • **Vitamin D: 25-50 mcg (1000-2000 IU) /day**		Use caution with the following supplements as they may interfere with the effectiveness of oral hypoglycemic drugs and/or cause additive blood glucose lowering effects and increase risk of hypoglycemia when used in combination. **Alfalfa** **Aloe Vera** **Alpha Lipoic Acid** **Bilberry** **CoQ10** **Chromium** **Garlic** **Ginkgo biloba** **Ginseng** **Green Tea** **Melatonin** **Milk Thistle** **Niacin** **St. John's wort** **Vitamin K_1**

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13. DIGIOXIN	Digoxin is derived from the leaves of the Digitalis lantata plant (a variety of foxglove). It is used to treat heart failure and atrial fibrillation.	**DND:** **Calcium** **Magnesium** **Phosphorus** **Potassium** **Vitamin B_1 (Thiamin)** **RECOMMENDED SUPPLEMENTATION:** • **Calcium: 500–1000 mg/day in divided doses** • **Magnesium: 250–400 mg/day** • **Potassium: ≤ 100 mg/day**		**Calcium:** High levels of calcium increase the likelihood of a toxic reaction to digoxin. Low levels of calcium interfere with the function of digoxin. Consistent intake of calcium and monitoring of calcium levels by a healthcare professional is recommended. **Hawthorn:** The activity of digoxin may be enhanced by hawthorn supplements. **St. John's wort:** St. John's wort supplements may reduce serum levels of digoxin.
14. DIURETICS		**DND:** **Loop diuretics (especially furosemide) can increase calcium excretion and decrease calcium status. Thiazide diuretics deplete magnesium, potassium, and zinc.** **Potassium sparing diuretics deplete folic acid.** **RECOMMENDED SUPPLEMENTATION:** **Loop Diuretics** **Calcium: 500-1000 mg/day** **Thiazide Diuretics** **Magnesium: 250-400 mg/day** **Potassium: ≤100 mg/day** **Zinc: 15 mg/day** **Potassium-Sparing Diuretics** **Folic acid: 240 mcg/day**		**Calcium:** Thiazide diuretics reduce calcium excretion by the kidneys and may increase risk for hypercalcemia, metabolic alkalosis, and possible renal failure. **CoQ10 and Fish Oil:** When taken together with diuretics, these supplements may have additive blood pressure lowering effects and increase risk for hypotension. **Ginkgo biloba:** Ginkgo may reduce the effectiveness of some diuretics.
15. HORMONE REPLACEMENT THERAPY (Estrogens)	Hormone replacement therapy is used to replace female hormones that are no longer produced after menopause.	**DND:** **Folic acid** **Magnesium** **Vitamin B_6** **Vitamin B_{12}** **RECOMMENDED SUPPLEMENTATION:** • **Folic acid: 240 mcg/day** • **Magnesium: 250–400 mg/day** • **Vitamin B_6: 2-5 mg/day** • **Vitamin B_{12}: 25–1000 mcg/day**		**Caffeine:** The stimulating effects of caffeine may be increased due to inhibition of metabolism or clearance of caffeine by hormone replacement therapy. **Calcium and Vitamin D:** Calcium and vitamin D may increase absorption of hormone replacements. These supplements are recommended to improve bone mineral density during estrogen therapy. **Red Clover Extract and Soy Isoflavones:** These supplements may interfere with the activity or absorption of hormone replacement therapy. **St. John's wort:** St. John's wort may alter hormone metabolism including estrogen and progesterone. This supplement is not recommended during hormone replacement therapy. **Zinc and Magnesium:** Excretion of these minerals is reduced by hormone replacement therapy.

*Suggested supplements that may support overall health and are not at all intended to replace any prescription medications.

**These supplements listed may have the potential to interact with the drug or drug classes. Use caution or avoid these supplements unless approved by your physician or preferred healthcare provider.

a. Iron may be affected H2 antagonists in those with elevated risk/pre-existing iron deficiency. However, iron is not recommended to be routinely supplemented while taking H2 antagonists. High levels of iron can cause unnecessary oxidative stress and other undesirable effects. Iron supplementation is only recommended for those with the effects of iron depletion (i.e. anemia).

b. Vitamin D is important for calcium absorption.

c. PPI use may be associated with reduced serum /plasma levels of vitamin C in patients with H. pylori infection.

d. Zinc may be affected by H2 affected by H2 antagonists. However, zinc supplementation may not be recommended for all individuals. One should consult their health care provider on the best option for supplementation and consider health status, health history, and current medication use.

e. An association between SSRI use and risk for osteoporosis has been established. In addition, SSRI's may impact bone formation and resorption through serotonin receptors.

f. Observational data have shown lower folate status in patients with major depressive disorder (MDD), compared to healthy controls. Discuss supplementation with your physician or preferred health care professional, especially if on SSRI antidepressant therapy.

g. Dilantin, Phenobarbital, and Tegretol can increase the metabolism/clearance of vitamin D, leading to a subsequent decrease of calcium absorption. Individuals taking these medications for 6 months or more should consider calcium and vitamin D supplements.

h. Dilantin, Phenobarbital, and Mysoline have been reported to reduce vitamin B_{12} absorption as well as serum and cerebrospinal fluid vitamin B_{12} levels in some individuals. Megaloblastic anemia and neuropsychiatric side effects have been associated with these drugs.

i. Vitamin C taken in adjunct with atypical antipsychotics may reduce oxidative stress.

j. Endogenous melatonin is depleted by benzodiazepines.

k. Calcium supplementation may be warranted with oral contraceptive use to help support bone health if dietary calcium intake is inadequate.

l. Serum levels of vitamin B_{12} have shown to be lower in those using oral contraceptives compared to non-users. Supplementation may be a consideration for individuals already at risk for low vitamin B_{12} status or a deficiency, such as vegetarians.

m. Low dose ferrous sulfate supplements may help alleviate ACE inhibitor-related cough.

n. Consider supplementing with vitamin D. Fat soluble vitamins (vitamins A, D, E, K) may be affected by medication use.

o. EPA and DHA omega-3 fatty acids help support heart health.

Sources:†

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4. Hyla Cass, M.D. A Practical Guide to Avoiding Drug-Induced Nutrient Depletion: http://nutritionreview.org/2013/04/practical-guide-avoiding-drug-induced-nutrient-depletion/

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†Additional references available upon request.

ABOUT PHARMAVITE

For over 50 years, Pharmavite has been a trusted leader in the wellness industry, recognized for providing high-quality vitamin, mineral and herbal supplements under its Nature Made® brand.

Nature Made® adheres to strict manufacturing standards and was the first national supplement brand to have a product verified by United States Pharmacopeia (USP), and it is the national supplement brand with the most products carrying the USP Verified Mark-verification that products meet stringent quality criteria for purity and potency.

Additionally, Pharmavite's commitment to Good Manufacturing Practices (GMPs) and quality extends to every aspect of our production, from purchasing high-quality raw materials, to the meticulous production and testing of every product. The dietary supplement industry is regulated by the U.S. Food and Drug Administration and the Federal Trade Commission Act, as well as by respective government agencies in each of the 50 states.

Pharmavite's emphasis on health and nutrition knowledge, emerging scientific research and new technology has enabled us to forge compelling partnerships with many distinguished educational institutions. The end result is that Pharmavite stays on the leading edge of key scientific advancements and innovations that make a difference in people's lives. Based in West Hills, California, Pharmavite operates as a subsidiary of Otsuka Pharmaceutical Co., Ltd. For more information, please visit http://www.pharmavite.com.