

My Current Top Five Easy Ways to Improve Your Family's Nutrition

(subject to change at any moment!)

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Introduction: This is a quick summary of some things in the nutrition news that can make a big difference in people's health. Although only a few references are provided in this brief version, all the suggestions are based on reports in the legitimate scientific literature and the references are available on my more thorough papers.

The recommendations are not based on goofy things on the internet.

When "researching" a topic on the internet, it is important to consider the reliability of the source. After all, there is no law against fiction in America! People can pretty much print anything. For example, websites that end in .edu (colleges and universities) tend to be more reliable than sites designed primarily to sell you something.

And of course, none of the following suggestions are intended to take the place of the advice of your health care provider.

1. Eat lots of brightly colored fruits and vegetables.

There are many beneficial phytochemicals (plant chemicals) that have been found to have a potentially protective role against a variety of common health problems such as cancer, heart disease, diabetes, MS, birth defects, and macular degeneration (a form of blindness.) Some of them act as protective "antioxidants," but they have many other benefits as well.

Some of the beneficial substances are actually the pigments that give the plants their color. Some examples are: lutein in green leafy vegetables, lycopene in tomatoes and watermelon, beta-carotene in peaches and carrots, anthocyanin in blueberries and beets and zeaxanthin in corn. It turns out that white is a color too, in terms of phytochemicals. Apples for example, have quercetin, a flavonol phytochemical with a number of potentially beneficial effects.

An example of other beneficial substances in fruits and vegetables is sulforaphane in broccoli, which decreases risk of colon cancer especially. Compared with meats, and high fat dairy foods, they are much lower in fat and calories. We tend to eat way too little of these terrific foods, and it hurts us. To get the best of all of them, eat a wide variety of fruits and vegetables of many colors, and aim for 9 servings a day (an amount that has been shown to be beneficial in some studies.) Some experts suggest even more.

My official recommendation is:

**“Eat all the brightly colored vegetables and fruits
you can get your hands on!”**

(And note that in plant-ville, white is also a color! That means that cauliflower, the insides of apples, and other white fruits and vegetables also contribute lots of healthful substances.)

Nine servings seems like a lot to most folks, since many people eat very few. In fact, the French fry is the most commonly eaten vegetable in America. Hmmmm. Not an ideal pattern. Start by adding a couple servings and working up. Throw some chopped green pepper and dried tomatoes on the pizza. Keep those ready-to-eat baby carrots on hand. Make it EASY for us to grab the healthier snack as we run out the door.

Canned, frozen or fresh fruits and vegetables all count because the brightly colored antioxidants are not destroyed by heat! If you use canned veggies, watch out for the salt they often can them with. Choose low sodium versions, or at least rinse them off. This is not an issue with fruits, or with frozen veggies except if they are packed in some kind of sauce. Remember that color is a big deal, so choosing only iceberg lettuce won't provide the dark green lutein found more generously in romaine or spinach. Color variety is key.

Check out “Aunt Cathy’s Ideas for Trying to Eat More of Those Terrific Antioxidant Phytochemicals . . . and Liking It” for ideas for adding them to our diet. This and many other nutrition topics are available at sanfordhealth.org, including any mentioned throughout this paper as having more information on a topic.

The dark leafy veggies are also terrific sources of vitamin K, a nutrient just now being recognized as critical to decrease risk of osteoporosis, diabetes, cardiovascular disease, kidney calcification, arthritis and liver and colon cancer.

It is also a nutrient found to be low in the diets of many Americans, and it has only recently been recognized that we are much more dependent on an oral intake of vitamin K than we thought. It used to be thought that intestinal bacteria provided significant vitamin K, but apparently that is a much less reliable source than we thought ... and even less helpful for anyone taking chronic antibiotics.

It appears that the elderly need more than the current RDA of 90-120 mcg/day to maintain an adequate level in their blood. Other age groups have not yet been evaluated in this way, but for several reasons it is very likely NOT just the older folks for whom the recommended intake levels are not optimal. This information is so new that vitamin K is not even included in many multivitamins currently on the market, and many health professionals will not yet have heard about these new issues.

If you are interested in learning more, I have a “Vitamin K” handout available that includes all the scientific references and detail on this topic.

Historically many people thought that vitamin K was potentially quite toxic because of being a fat-soluble vitamin. However, it is now well documented that vitamin K is a very safe substance and the fact that it will dissolve in fat has nothing to do with toxicity. In fact, no “Upper End of Safety” has ever been identified for vitamin K because no one ever overdosed on it. So go ahead and eat all the broccoli, spinach, kale, asparagus and romaine lettuce you can. **The only cautionary note is for people using a particular medication described in the box below. If you are NOT taking this medication, vitamin K is very safe and it is critical to assure an adequate intake.**

If you are taking the medication Coumadin / warfarin to prevent blood clots, be sure to show this information to your doctor before adding dark green vegetables to your diet.

New research on the relationship between vitamin K and these drugs will result in changes in how we do things. But because the information in support of these changes is very new, it will also be new to many healthcare providers, so I also have a special “Vitamin K” handout available that includes all the scientific references and detail for any health professional helping people using Coumadin/warfarin anticoagulant drugs. **It is very important that your doctor sees this information before any changes in diet or medication are made.**

Besides the benefits of avoiding complications from use of this drug that can develop due to vitamin K deficiency (like osteoporosis), **daily supplementation with RDA levels of vitamin K also seems to make these drugs safer to use by minimizing extreme volatility in blood coagulation.** [Higher levels of regular vitamin K supplementation have not yet been studied but the issue likely will be looked at more closely now that the RDA levels have been found to be insufficient to maintain appropriate blood levels of vitamin K. Other anticoagulant drugs do not work by interfering with vitamin K so it is only an issue with the specific drug Coumadin/warfarin. Your doctor can also contact me for the most recent reports on this topic

2. When you eat grains, try to use whole grain whenever possible.

The “germ” (the part that becomes the baby plant) and the bran (the fibrous coating) of grains are removed in processing when grains are “refined.” These are the parts that would have contributed the most magnesium, chromium, vitamin E, fiber and many other nutrients. Magnesium and chromium have important roles in using the rest of the grain (the starchy part) for energy and for avoiding diabetes.

Large national studies (such as NHANES by the National Center for Disease Control in Atlanta) have shown that the majority of Americans have a diet too low in these minerals. This inadequacy contributes to weight problems, diabetes, heart disease and some neurologic problems that are too common in our society.

“Enriched” grain products have only a few nutrients replaced (vitamins B1, B2, B3, and iron) out of all the nutrients that are removed when refining grain. This label can be confusing because the word “enriched” sounds like something was made to be even better. Instead, it means “not as nutritious as whole grain.”

I always tell people to read the word “enriched” as “**UN-riched,**” because it is not nearly as nutritious because whole grain includes the “germ.”

The germ is the part of the grain that will turn into the “**baby plant,**” so that’s where a whole lot of vitamins and minerals and essential oils are found. Most of the rest of the grain is just fuel for the baby plant to use until it can poke its nose out of the soil and do photosynthesis.

So eating just the fuel part without all the tools you need to use it efficiently (like magnesium and chromium in the germ) can contribute to our current problems with weight gain and diabetes. If you don’t like whole grain bread and pasta, you can still add back the nutrients and fiber they contain by adding wheat germ and bran to other foods. Check out “Aunt Cathy’s Industrial Strength Instant Oatmeal Recipe” for some ideas. And the next

section talks about some other important foods to explore that have many of the same terrific nutrients found in the germ of whole grains.

3. Nuts, seeds, peanuts and dried beans/peas are terrific nutrient-rich foods because like the germ of grains, they are essentially the germ of new plants.

For example, in one study from Harvard, eating an ounce of nuts or peanuts four times a week or more was shown to be related to 25% less likelihood of developing diabetes. This appears to be associated with the generous magnesium in these foods.

I remember these magnesium-rich foods easily by thinking of them as “**Baby Plants**” ... the part of the plant that one puts in the ground to get a baby plant.

These foods also have more “satiety value” – you feel like you actually ATE something” -- and they are terrific nutritious snacks including for people who are watching their weight or who have diabetes.

Although all fats have about 9 calories per gram, the forms of fat in nuts and peanuts (mostly “monounsaturated” and “omega-3” fats) are less contributory to heart disease than many other forms of fat. Also they are rich in nutrient content so they are not an “empty calorie” food. So, although they do have calories, I think of these forms of fat as potentially “Dangerous to your butt, but not to your heart!” Additionally, dried beans and peas are also very low in fat and high in fiber. It looks like that means chili beans, lima beans, split peas, chick peas, navy beans, lentils, pinto beans, etc., are “health foods!”

These foods, and assuring adequacy of magnesium (and chromium, another key mineral in the same foods) in general, are especially beneficial for people who appear to be genetically (or for whatever reason) at greater risk of developing diabetes. This includes people who have family members with diabetes, people who are overweight, and some ethnic groups who appear to be disproportionately at risk.

For example, serious health problems related to diabetes have been found to be causing much more injury to Native Americans and African Americans than to some other groups of folks. **There are many contributing factors, of course, but assuring adequacy of magnesium and chromium (another key mineral in the same foods) is one factor that can be easily corrected if people just hear about it.** Adequate chromium intake is also associated with some other heart disease risk factors like helping prevent having high triglycerides (a particular form of fat) in the blood. [Vitamin D is another, as discussed later.]

Note: Certain medications to control stomach acid can impair magnesium absorption. These are called “Proton-Pump Inhibitors” (PPIs) and they are very commonly used. So, if one is taking those medications it is important to have a generous food source of magnesium and in addition physicians may prescribe a daily RDA-level magnesium supplement as well. The current RDA for magnesium is 320-420 mg/day. Some researchers think intake should be closer to 1000 mg/day (unless one has a medical condition in which magnesium is restricted) and that the combination of a multivitamin with minerals plus a diet rich in these foods that are “baby plants”

Most multivitamins with minerals will provide about ¼-1/3 of the RDA for magnesium. The best forms to choose as supplements are magnesium chloride or magnesium oxide ... and not magnesium citrate. Hmmm ... the magnesium citrate is what one takes in a generous amount to clean out the bowel prior to intestinal surgery or a colonoscopy, so the side effects can be quite unwelcome. Please see my separate papers on Magnesium and on Drug-Nutrition Interactions for more information.

4. Another important form of fat to include in our diet is a family called the “omega-3” fats: linolenic acid, EPA and DHA

A lot of research shows that it is associated with a decreased risk of cancer, heart disease, inflammatory disease, depression, pregnancy problems, and much more. We Americans tend to eat too much of another family of fat called omega-6 fat, such as that found in corn oil. To improve the balance in the American diet, **flax, canola and walnuts** are great plant sources of omega-3 fat.

Additionally, there is a huge amount of research showing that the special forms of omega-3 fats found in **fish and fish-oil and krill supplements (EPA and DHA)** have certain very important advantages for many people. EPA decreases the degree of inflammation in a wide range of inflammatory diseases like MS, cardiovascular disease and arthritis. I think of **EPA** (whose real name is **eicosapentaenoic acid**) should be thought of as “**Environmental Protection Agency**” instead, because it seems to be very protective against a number of health problems.

DHA in particular appears to be very important for the development of the brain and the retina of the eye, so it is critical during pregnancy and infancy. It has also been shown to be helpful in the continued good operation of the brain (e.g. in possibly helping to ward off age-related problems like alzheimers and other forms of dementia,) and

for decreased risk of, or progression of, depression, blindness due to macular degeneration, attention deficit disorder and Parkinson's disease.

More research is ALWAYS needed, of course, but the cumulative results of a great many studies have been in the same direction. Assuring an adequate intake of these fats looks like a VERY good idea. **Additionally, it is now recognized that for some people it is difficult to efficiently convert the plant omega-3 oils (like those in canola, flax and walnuts) into the important EPA and DHA oils that are found ready-made in the fish or krill oil.** This appears to be a factor in a broad range of inflammatory conditions and critical in pregnancy.

The American Heart Association recommends 1000 mg of fish oil for most people with risk of heart disease. People at risk include those who smoke, who have disturbed blood lipids (too much LDL cholesterol or triglycerides, or too little HDL cholesterol,) who are overweight or sedentary (not physically active,) or who have high blood pressure, diabetes, or a family history of heart disease. Other factors contribute to heart disease risk as well. Additionally, some people who have "high triglycerides" specifically may benefit from 2000-4000 mg/day.

Saturated fats have long been on our list of "foods to eat less of." They include lard/meat fat / dairy fat, and "hydrogenated" (solidified) or "partially hydrogenated oils" (shortening / margarine) and coconut oil. None is a good source of omega-3 fat. Eating less of most of them and choosing foods that are more generous in their omega-3 fat content is a very good idea.

However, newer research on coconut oil (a predominantly saturated fat) suggests that this fat is NOT associated with increased heart disease risk the way a "high lard diet" has been thought to be. That means that "saturated-ness" alone is actually not the key factor after all when evaluating the health properties of fats and oils.

Some shortenings and margarines contain "**trans**" fat, a truly "good- to avoid" form of fat that must be shown on the nutrition labels of foods if there is more than ½ gram per serving. It is usually in food because the oil was "partially hydrogenated" to make it solid at room temperature like margarine or shortening. **That means that if you see the words "partially-hydrogenated" on the ingredient label, there is likely some trans fat present.** The amount per serving may be less than ½ gram of trans fat per serving, but some of us have been known to eat more than one "serving" of margarine (1 teaspoon) on our mashed potatoes, sandwiches, toast or pancakes. In other words, it can add up pretty quickly.

Trans fat is gradually being removed from our food supply because it is quite unhealthy. The biggest source at present is in baked goods made with shortening. Some margarines and shortenings are now made that have no trans fat in them, and they usually

note this on the label because it is such a good thing ... but remember to watch for that “partially-hydrogenated” term on the ingredient list.

If it is not there you can be more certain that no matter how much margarine or shortening you eat, it will not provide trans fat. “Unmarked” baked goods are still a potential source since the labeling is absent. You can ask in the bakery department what kind of fat they use. Trans fats are actually now being banned in some places around the country so this may quit being an issue.

5. Increase your regular intake of vitamin D to assure an intake that averages at least 2000 iu per day (for many folks 2000-5000 iu) and take a multivitamin with minerals daily in addition to “eating right.”

In addition, it appears to be a good idea to get one’s vitamin D level checked at least once to see if the amount of vitamin D taken is sufficient to keep one in the normal range. (The test called a “25-hydroxy vitamin D level”)

This is a markedly different recommendation because new research shows that older recommendations of 200-400-600 iu of vitamin D were simply **too low to assure adequacy**. Some researchers have found even 2000 iu to be too little for some people in terms of optimizing health and minimizing disease risks. This is especially true among people with dark or old skin, those who use sunscreen or seizure-control medications, or who live up north. **In the northern third of the country vitamin D deficiency is now described as “an unrecognized epidemic” and checking people’s vitamin D level is now the individual nutrient assay most frequently ordered by physicians in the US.**

It is now known that inadequate vitamin D status is very common, and that it is associated with increased risk of diabetes, lupus, scleroderma, fibromyalgia, multiple sclerosis, cancer of the breast, colon, prostate, endometrium and pancreas, congestive heart failure, coronary artery disease, muscle pain, osteoporosis, rheumatoid arthritis, osteoarthritis, obesity, muscle weakness and falls, and possibly preserving cognitive function in older adults.

Other research reports have also found that vitamin D inadequacy is a factor in heart disease. In a “meta-analysis” (looking at data of many studies at once) also published recently, the risk for mortality (death) from all causes was found to be significantly less among people taking an ordinary dose of a vitamin D supplement

compared with those who did not. Another prospective study reported earlier concluded that a **low vitamin D level in the blood was associated with a higher risk of death from all causes, and specifically with heart attack as well.**

Other associations of inadequate vitamin D are now found such as increased risk of parkinsonism, autism, asthma, impairment of the immune system, cancer of the lung, pre-eclampsia (a serious complication of pregnancy) and premature birth. **This is not surprising because it has now been recognized that vitamin D actually functions as a key steroid hormone -- one that your body would make as needed ... if you just give it enough of the material to do the job.**

Over 200 different body tissues have been identified so far that have receptors for the vitamin D hormone, and they need it in order to work properly. Vitamin D is a unique vitamin also because its metabolic product, calcitriol, is a profound secosteroid hormone that has **impact on over 1000 genes** in the human body.”

Poor vitamin D status has more recently been shown to contribute greatly to heart muscle weakness specifically ... commonly called **congestive heart failure**. Correcting deficiency can improve the situation significantly.

Two other important reports on vitamin D status and heart health just came out in March, 2017. One described a newly recognized relationship between increased risk of cardiovascular disease (heart disease) with low vitamin D status.

This very large and important study is one done every ten years by the CDC (Center for Disease Control.) It is called the NHANES (the National Health and Nutrition Examination Survey.) Over 7,000 individual were in the study.

[Standardized serum 25-hydroxyvitamin D concentrations are inversely associated with cardiometabolic disease in U.S. adults: a cross-sectional analysis of NHANES, 2001–2010 Nutrition Journal (2017) 16:16.]

The other report addresses the problem of muscle pain as a common side-effect of statin use (commonly used **drugs to lower cholesterol**.) A review of seven studies found that **the pain is more common in people whose vitamin D level was lower than in those with higher levels. Additionally, people whose pain made them stop taking their statin drug were more likely to be able to resume taking the prescribed statin drugs if their low vitamin D level was corrected.** [Vitamin D and Statin-Related Myalgia March 10, 2017 http://www.medscape.com/viewarticle/876941?src=wnl_edit_tpal]

[Standardized serum 25hydroxyvitamin D concentrations are inversely associated with cardiometabolic disease in U.S. adults: a cross-sectional analysis of NHANES, 2001-2010. Nutr J 2017 16:16. Vitamin D and statin-related myalgia. Medscape.com/viewarticle/876941_print. The Effect of Vitamin D on Aldosterone and Health Status in Patients with Heart Failure. J Card Fail. 2014 Feb 4. pii: S1071-9164(14)00062-1 Severe vitamin D deficiency is associated with frequently observed diseases in medical inpatients. Int J Clin Pract. 2014 Feb 6. Relation of vitamin d status to congestive heart failure and cardiovascular events in dogs. J Vet Intern Med. 2014 Jan;28(1):109-15 Vitamin D receptor activation and prevention of arterial ageing. Nutr Metab Cardiovasc Dis. 2013 Dec;23 Suppl 1:S31-6 Vitamin D status and community-acquired pneumonia: results from the third National Health and Nutrition Examination Survey. PLoS One. 2013 Nov 15;8(11):e81120. Vitamin D in heart failure. J Card Fail. 2013 Oct;19(10):692-711 Electromechanical Effects of 1,25-Dihydroxyvitamin D with Atrial Fibrillation Activities. J Cardiovasc

Electrophysiol. 2013 Oct 23. Short-term vitamin D3 supplementation lowers plasma renin activity in patients with stable chronic heart failure: an open-label, blinded end point, randomized prospective trial (VitD-CHF trial). *Am Heart J.* 2013 Aug;166(2):357-364.e2. *Int J Cardiol.* 2013 Oct 3;168(3):2341-6. Vitamin D and prognosis in acute myocardial infarction. *Int J Cardiol.* 2013 Oct 3;168(3):2341-6. The influence of selective vitamin D receptor activator paricalcitol on cardiovascular system and cardiorenal protection. *Clin Interv Aging.* 2013;8:149-56. Can vitamin D supplementation improve the severity of congestive heart failure? *Congest Heart Fail.* 2013 Jul-Aug;19(4):E22-8. Prevalence of vitamin D deficiency during the summer and its relationship with sun exposure and skin phototype in elderly men living in the tropics. *Clin Interv Aging.* 2013;8:1347-51. The influence of selective vitamin D receptor activator paricalcitol on cardiovascular system and cardiorenal protection. *Clin Interv Aging.* 2013;8:149-56. Cardioprotective effect of calcitriol on myocardial injury induced by isoproterenol in rats. *J Cardiovasc Pharmacol Ther.* 2013 Jul;18(4):386-91. The world pandemic of vitamin D deficiency could possibly be explained by cellular inflammatory response activity induced by the renin-angiotensin system. *Am J Physiol Cell Physiol.* 2013 Jun 1;304(11):C1027-39. Prevalence and consequences of vitamin D insufficiency in women with takotsubo cardiomyopathy. *J Clin Endocrinol Metab.* 2013 May;98(5):E872-6. Vitamin D signaling pathway plays an important role in the development of heart failure after myocardial infarction. *J Appl Physiol (1985).* 2013 Apr;114(8):979-87. The role of vitamin D in chronic heart failure. *Curr Opin Cardiol.* 2013 Mar;28(2):216-22. Relationship between vitamin D status and left ventricular geometry in a healthy population: results from the Baltimore Longitudinal Study of Aging. *J Intern Med.* 2013 Mar;273(3):253-62. Circulating calcitriol concentrations and total mortality. *Clin Chem.* 2009 Jun;55(6):1163-70. Vitamin D and cardiovascular disease. *Pharmacotherapy.* 2009 Jun;29(6):691-708. Serum vitamin D, parathyroid hormone levels, and carotid atherosclerosis. *Atherosclerosis.* 2009 Jun 6. Prospective Study of Serum 25-Hydroxyvitamin D Level, Cardiovascular Disease Mortality, and All-Cause Mortality in Older U.S. Adults. *J Am Geriatr Soc.* 2009 Jun 22. Increased Levels of 25 Hydroxyvitamin D and 1,25-Dihydroxyvitamin D After Rosuvastatin Treatment: A Novel Pleiotropic Effect of Statins? [*Crestor*] *Cardiovasc Drugs Ther.* 2009 Jun 20. Independent association of low serum 25-hydroxyvitamin D and 1,25-dihydroxyvitamin D levels with all-cause and cardiovascular mortality. *Arch Intern Med.* 2008;168(12):1340-1349. Vitamin D and cardiovascular disease risk. *Curr Opin Clin Nutr Metab Care.* 2008 Jan;11(1):7-12. Macro- and micronutrients in patients with congestive heart failure, particularly African-Americans. *Vasc Health Risk Manag.* 2007;3(5):743-7. Vitamin D supplementation & total mortality: a meta-analysis of randomized controlled trials. *Arch Intern Med.* 2007 10;167:1730-7]

Can we make adequate vitamin D in our skin?

Vitamin D is made by the effect of sunlight on our skin. That's why it is called the "Sunshine Vitamin." That is one reason why for a long time everyone was assumed to be just fine in terms of vitamin D adequacy. But it is now apparent that many different factors can interfere with this process so that many people actually make too little vitamin D to meet their needs:

Who are the people at risk of being unable to make enough vitamin D to meet their needs?

People who live in the northern half of the US are unable to make vitamin D for some or many months out of the year. This is the area all around the world north of 37° N latitude [or farther south than 37° S latitude in the Southern Hemisphere.] The number of months in which the rays of the sun are not strong enough to produce vitamin D in the skin ranges from about 2 months at the 40th parallel (around Denver) to 4 months at the 42nd parallel (around Chicago.)

When you live way up north where I do, there are MANY months that the sun's rays are too weak. If you do the math, you see that we lose about 1 month for each degree of latitude over the 37th parallel. The upper border of much of the contiguous US is the 49th parallel, and Alaska is WAY up there, so it is not surprising that the northern third of the US was traditionally called the "rickets belt" because that vitamin D deficiency disease was so very common up here.

The map is shown at the end of this paper. Until the late 1940s, about half of all babies up north were noted to suffer from some degree of bone deformity due to vitamin D-deficiency.

1. People who do live where the angle of the sun is more directly overhead (i.e. not up north in the northern hemisphere and not down south in the southern hemisphere) may still fail to produce adequate vitamin D in their skin **because their skin is darkly pigmented** or because of other factors. For example, really dark skin produces less vitamin D than light skin for the same sun exposure. Other factors that make vitamin D deficiency now much more common even in the South are the **use of sun-screen** to reduce risk of skin cancer, and the **availability of air conditioning**. Hey ... it can be pretty hot down there!
2. Similarly, **older people** (including me) produce less vitamin D in their skin than a younger person would produce. An interesting study found that elderly men who lived in Rio de Janeiro, Brazil had low vitamin D levels even though they lived near the equator all their lives.

[Prevalence of vitamin D deficiency during the summer and its relationship with sun exposure and skin phototype in elderly men living in the tropics. *Clin Interv Aging*. 2013;8:1347-51.]

3. People who are **severely overweight** appear to have higher vitamin D requirements.
4. People who take any kind of **anti-seizure medications (epilepsy drugs)** need more vitamin D because the drugs cause the vitamin D to turn over more rapidly.
5. People with conditions that interfere with absorption in the intestine will also fail to absorb vitamin D from foods or supplements, so they are much more dependent on the vitamin D produced in the skin than other people. They need to take in significantly higher than usual amounts to maintain a safe vitamin D level. This can include people **with inflammatory bowel disease (like Crohn's Disease,) Cystic Fibrosis, and unrecognized or poorly controlled Celiac Disease.**
6. People who are **covered up** with clothes or sunscreen most of the time also make much less vitamin D regardless of where they live. Similarly, staying in the air- conditioned indoors will diminish the amount of actual sun exposure, and many of us do not choose to be out in hot weather if we can avoid it. For example, people with MS often do not tolerate hot weather. People who **work nights** also need to think about this.
7. Light that comes through windows does not do the job.

Vitamin D inadequacy is now being demonstrated to be a big public health issue all over the world even in hot and sunny climates.

It is estimated that about **50% of the earth's population is at risk of vitamin D deficiency**. Even at the equator there are many reports of people being found to have serious vitamin D deficiency simply because they are covered up much of the time.

Some people are covered up for religious reasons, some to prevent skin cancer (melanoma) and some of us are just covered up as a public service! ☺ MANY people are simply unable to make enough vitamin D on our own for all the reasons described above, so they need to assure adequacy some other way.

Vitamin D deficiency is now being recognized more and more in southern places where the assumption has been that there is no risk in all that sunshine ... but a whole bunch of us just don't go out in the sun much.

One reason we are seeing more evidence of the epidemic nature of vitamin D deficiency is because many more doctors are checking their patients' blood levels. **In fact, a vitamin D blood measurement (called a "25-hydroxy-cholecalciferol level") is now the additional lab test ordered most frequently by physicians in the US.**

[Sunlight, UV-radiation, vitamin D and skin cancer: how much sunlight do we need? Adv Exp Med Biol. 2008;624:1-15. Vitamin D deficiency: a worldwide problem with health consequences. Am J Clin Nutr. 2008 Apr(4);87:1080S-6S.]

Did you know that the men at greatest risk of prostate cancer are older African-American men living in the north? African-American women living in the north also have a higher incidence of breast cancer, which appears to also be associated with low vitamin D status. Many researchers believe that we can lower the risk by correcting the inadequacy of vitamin D that is so common among people up north and among people of color.

For example, blood tests evaluating the ACTUAL vitamin D status of **African-American mothers and their newborns in Pittsburgh found that over half in each group were vitamin D deficient, even if prenatal vitamins were regularly used.** This has many very serious implications, but it could be remedied by more generous supplementation of this key vitamin. Attention to this is long overdue. **About a third of white mothers and babies in the same northern study were also found to be deficient.**

In another report it was found that a daily intake of 2000 iu of vitamin D assured that most dark-skinned northern women in a study maintained a desirable blood level of greater than 50 ng/ml. Another study found that 2000 iu daily could raise the storage form of vitamin D in blood to 52 ng/ml, a level associated with reduction by 50% in incidence of breast cancer in observational studies. Ironically, 2000 iu daily had long been set as the presumed upper level of safety for vitamin D intake. **Many experts have expressed the opinion that based on more recent research the upper level of safety should be changed to a chronic intake of over 10,000 iu daily.**

What serum (blood) levels of vitamin D are associated with good health?

A 2008 report found evidence suggesting that higher vitamin D intakes beyond current recommendations may be associated with better health outcomes. They looked at a number of studies related to bone mineral density (BMD), lower extremity function, dental health, risk of falls, admission to nursing homes, fractures, cancer prevention and hypertension (high blood pressure.)

They concluded: “For all endpoints, **the most advantageous serum levels for 25(OH)D appeared to be at least 75 nmol/l (30 ng/ml) and for cancer prevention, desirable 25(OH)D levels are between 90-120 nmol/l (36-48 ng/ml). An intake of no less than 1000 IU (25 mcg) of vitamin D3 (cholecalciferol) per day for all adults may bring at least 50% of the population up to 75 nmol/l.**

Thus, higher doses of vitamin D are needed to bring most individuals into the desired range. **While estimates suggest that 2000 IU vitamin D3 per day may successfully and safely achieve this goal, the implications of 2000 IU or higher doses for the total adult population need to be addressed in future studies.** [Optimal serum 25-hydroxyvitamin D levels for multiple health outcomes. Adv Exp Med Biol. 2008;624:55-71.]

Note that this report ... and MANY others ... have been trying to get our attention to the serious vitamin D inadequacy problem for a long time. For example, I started driving people crazy about it in 1996 when I saw the map of vitamin D deficiency at the end of this paper that was published by Harvard University. Even the study described above is nearly ten years old.

Clearly a lot more research is needed ... it is ALWAYS needed. But these many (new and not-so-new) reports are a great illustration of the emerging broad importance of this issue. **The 2000 iu level is safe in general and above the 2000 iu level is safe (and may be necessary) in some cases . . . what is clearly NOT safe is allowing a person to have a low vitamin D level.**

For many reasons, some individuals (including some of my patients) are unable to maintain safe vitamin D levels even if they take a 2,000 iu supplement daily. Some people have needed 5,000 iu vitamin D daily to keep their blood level in the safe range. That is why I think it is a good idea for everyone to have their vitamin D level checked at least once, with follow-up if it is found to be low regardless of their current intake.

[Vitamin D Status: Measurement, Interpretation, and Clinical Application. Ann Epidemiol. 2008 Mar 8. Sunlight, UV-radiation, vitamin D and skin cancer: how much sunlight do we need? Adv Exp Med Biol. 2008;624:1-15. Vitamin D deficiency: a worldwide problem with health consequences. Am J Clin Nutr. 2008 Apr;87(4):1080S-6S. A useful website for converting ng/mL (mg/dL) to nmol/L: om/medical/unitconvert/Vitamin_D.php]

Taking in this amount of vitamin D will require using a supplement.

The primary supplemented food in our diet is fortified milk with 100 iu/cup, but 20 cups of milk daily would be needed to take in 2000 iu/day. This is clearly not reasonable, nor is it good nutrition. One would have no room left for other foods! Some (but not all) orange juices and yogurts are now being fortified with vitamin D, but the fortification is also too low at just 100 iu/cup.

Some commercial “nutritional beverages now advertise that they have “doubled” the amount of vitamin D provided in their products. Because these products are assumed to represent only one meal’s worth of nutrition per serving, the products may now have 200 iu vitamin D in an 8 oz serving instead of 100 iu. So, yes, the amount is doubled. But **it is still wildly inadequate as a reasonable intake of vitamin D for a single day.**

I wish this marketing were less tricky for all the people trying to get the nutrition they need. The ads give the impression that for “active adults who sometimes are too busy to eat right” a serving of the nutritional beverage will make up for the missing nutrition. Ad imagery often includes a handsome older man vigorously chopping wood or a silver-haired couple strolling romantically along the beach with their favorite nutritional beverage in hand. (I know ... I am just jealous.)

Note that I am not suggesting that the vitamin D solution is solved by having a person drink 10 cans of it a day to get the suggested 2000 iu of vitamin D ... or drink 25 cans to get 5,000 iu. I am just clarifying that while these products can be a nutritious beverages and contribute to the overall picture, to assure adequacy of vitamin D it would be far better to simply add a tiny 2,000-5,000 iu vitamin D capsule to the mix instead of trying to solve vitamin D inadequacy with nutrition beverages. Not only is trying to get

all one's vitamin D from nutritional beverages an unreasonable task, it is also a way more expensive route.

Vitamin D supplementation of other foods (for example, grain products) needs to be explored. In 1998 folic acid supplementation of grain products and it had a significant effect in reducing certain types of birth defects and stroke. Many experts believe that this kind of intervention is the best way to solve the problem of vitamin D inadequacy, and progress is being made in that direction.

While we wait for that eventuality, we need to address the problem some other way as a short term solution to vitamin D inadequacy

Start with a regular “multivitamin with minerals.”

That usually provides 400 iu. If you drink a lot of milk, that combination may be adequate. Otherwise, you can easily add an inexpensive, tiny, easy-to-swallow 400–5,000 iu vitamin D capsule, or a calcium supplement with a some (variable) amount of vitamin D. There are even 400-1,000 iu “gummi” and liquid type vitamin D products available. There are also 400 iu vitamin D drops for infants because the American Academy of Pediatrics and other professional health organizations recommend that all infants receive 400 iu iu vitamin D daily.

Vitamin D can be stored well in the body and it is generally very well absorbed into the bloodstream from the intestines, so some people prefer taking more at once but less often ... for example, taking a week's worth of extra vitamin D all on one day each week. **Vitamin D is generally “best” absorbed if taken with the largest daily meal, but the differences are usually not very important, especially if the total amount is generous and not skimpy.**

There are many ways to obtain an adequate amount even if it is not done in the most ideal manner.

For example, I have some memory problems and I simply would not remember to take things throughout the day for “optimal absorption.” So, I just take everything all at once and let 'em fight it out in there! It doesn't have to be perfect... or expensive.

There are few foods naturally high in vitamin D – really just salmon, tuna, liver and cod-liver oil – which are problem foods for many people. We will very likely begin to see more foods being supplemented now that the public is becoming aware of the issue. As noted earlier, some yogurt and cheese products now have a little vitamin D added, and the calcium-fortified orange juices are often now supplemented as well. **However, the amount added is still in the low level range used to fortify milk: only 100 iu/cup.**

Happily, in the future it may be that in the interest of public health, grain products in the US will be fortified with some amount of vitamin D so that milk would no longer be the only food standardly supplemented. . [Note also that milk “straight from the cow or goat” does not contain any vitamin D, so some of our farm families get none and they are often quite unaware of it.] Supplementing grain products would give folks a better chance to take in at least SOME vitamin D without having to think about it.

If you are among those folks who are particularly at risk of vitamin D deficiency, assuring vitamin D adequacy will require taking an additional vitamin D supplement even if you do drink a lot of milk and take a multivitamin.

Who are people who are at particular risk of vitamin D inadequacy?

That group includes people who:

have dark skin,

live up north,

are covered up,

use sunscreen,

are old,

can't tolerate heat,

take medications to control seizures, or

are not drinking 10-25 cups of fortified milk daily

... in other words, pretty much everybody.

Vitamin D Inadequacy in Pregnancy and Breastfeeding Alert

Interestingly, mother's milk is an amazingly nutritious food and breastfeeding is certainly encouraged. However, at this time in history the milk does not contain much vitamin D. This is probably because when people were invented nobody lived in Fargo. ☺ Babies would have crawled around down by the equator and made their own vitamin D in their skin. Mother would also have adequate sun exposure so their milk would also provide vitamin D.

But up here in the North, we have had to make a number of adjustments to survive... many of us have bought a furnace, a coat, really good mittens and we also need to take in more generous vitamin D. It is that simple.

Because of the finding of serious vitamin D deficiency in many breast-fed babies, in 2003 the American Academy of Pediatrics recommended that breastfed babies be given "at least 200 iu of vitamin D by two months of age."

In 2008 that recommendation was changed to 400 iu/day for all infants and they recommended starting it right away because many babies were actually born with inadequate stores of vitamin D because their mothers were deficient during pregnancy (in spite of taking prenatal vitamins.)

This change brings US recommendations in line with those of their Canadian colleagues who have recommended 400 iu for babies, and at least 800 iu for everyone else up there for several years now. Here are some details of the kind of research that led to this change in recommendation:

A study in Boston of 380 healthy infants and toddlers who were seen for a routine health visit found that the prevalence of vitamin D deficiency (≤ 20 ng/mL) was 12% (44/365 children), and 146 children (40%) had levels below an accepted optimal threshold (< 30 ng/mL.*)

[Prevalence of Vitamin D Deficiency Among Healthy Infants and Toddlers *Arch Pediatr Adolesc Med.* 2008;162(6):505-512. Neonatal vitamin D status at birth at latitude 32 degrees 72': evidence of deficiency. *J Perinatol.* 2007 Sep;27(9):568-71. There are a lot more studies that have come out since pointing in the same direction, These are just among the first to get our attention to this problem.]

The same Boston authors studied the therapeutic amounts of vitamin D supplementation needed to correct the low vitamin D status of the children. They concluded that these two approaches were effective for bringing low vitamin D levels into the range of ≥ 30 ng/mL* within a 6 week treatment period:

Daily 2000 IU vitamin D or Weekly 50,000 IU vitamin D

[Treatment of Hypovitaminosis D in Infants and Toddlers. J Clin Endocrinol Metab. 2008 Apr 15.]

*Note that that 30 ng/mL threshold was identified as being the divide between inadequacy and adequacy, and it is a very important number. However, it is not intended to identify the vitamin D levels shown to be associated with the best health outcomes.

The overall “normal” range of blood vitamin D levels goes from 30 (on the bottom edge of the OK range) up to 80. The range associated with more positive health outcomes appears to be at least 40 and for some situations (e.g. for cancer-related outcomes) a level of 60 or above is desirable. [For more on this topic please see my separate paper “Vitamin D: A Quick Review of Forms, Labs and Other Things People Have Asked Me About Recently”]

Take that multivitamin/minerals for other important reasons as well.

1. Vitamin B12 Deficiency

Besides the welcome 400 iu of vitamin D, multivitamins provide **vitamin B12 in a form that is easier to absorb and use** by people taking certain common medications, those who have certain genetic traits, and people who experience some age-related changes in the stomach.

For example, some people take “**proton pump inhibitor**” medications (the strong blockers of stomach acid production for heartburn or “gastro-esophageal reflux.” These medications were noted earlier to impair absorption of magnesium, and they also impair absorption of vitamin B12 in foods. People can be unable to obtain vitamin B12 from normal food sources because the process requires the presence of acid in the stomach. However, they CAN absorb the vitamin B12 in the vitamin pill form.

Similarly, **a third of the elderly are found to be vitamin B12 deficient** when the most sensitive tests are used. That’s a lot of people! Often it happens for the same reason ... an age-related decreased production of stomach acid.

Both of these invisible vitamin B12 absorption situations can cause very serious health problems ... and both are prevented by simply taking a regular multivitamin! So, without having to know if you are personally at risk or a family member is at risk, the simple use of the multivitamin will prevent a number of serious problems. The problems to be avoided in this way include nerve damage, cancer, depression, stroke, falls and birth defects.

However, some other causes of vitamin B12 deficiency will NOT be corrected just by the multivitamin (although people should still take one for other reasons, of course.) For example, the **diabetes medication Metformin (Glucophage) also can also have a negative effect on vitamin B12 status.** This is also true of a very serious vitamin B12 deficiency condition called **“pernicious anemia.”** These are both caused by factors other than the changes in stomach acid.

Vitamin B12 issues with Metformin or pernicious anemia will need to be monitored and corrected by your health care provider, as the simple multivitamin will not solve those problems. **A shot or special form of vitamin B12 (such as one that is dissolved under the tongue) may be needed.**

(For more information on vitamin B12 issues,
please see my vitamin B12 paper ... it has cartoons!)

Note: I do not sell anything.

I just think that the evidence is quite clear that taking a multivitamin is a very good idea for everyone, and more and more professional health associations are of the same opinion. A low cost product is just fine, contrary to the claims of people who are trying to sell you a pricier “pyramid scheme” product.

Children’s chewable vitamins are very similar to adult products, and they can be very useful for people with trouble taking pills or who have concerns about the vitamin’s ability to dissolve and be well absorbed in the intestine. Now there are “adult” chewable multivitamins with minerals available. Most product labels say for ages under four give ½ tablet daily, and for ages four-through-adult, take a whole one daily. Read the label.

Note that many children’s and adult vitamins are not very complete. Some very popular products like some “gummi” vitamin products are actually quite incomplete and therefore not the best choice for a multivitamin.

It is a good idea to pick a product that says “Complete” on the label (even though NONE of the vitamins on the market are actually complete.) The labels show that some products clearly provide nutrients that other products (including others by the same manufacturer) have left out. Some products will advertise some special feature to make them stand out in the crowd, and it is often an unimportant distinction. For the most part, just a complete-type generic “multivitamin with minerals” is just fine, and much less costly.

Another nutrient problem has recently been found to need more attention here and around the world:

2. IODINE DEFICIENCY.

In many parts of the world (including the US --- see map at the end of the paper) iodine deficiency is common, and for over 50 years the traditional international approach to solving it has been to add iodine to salt. However, it appears that **the amount obtained from iodized salt is actually not sufficient, especially during pregnancy, and that even in areas thought to have corrected iodine deficiency many women obtain too little.**

Iodine deficiency is the number one cause of preventable mental retardation in the world.

Iodine deficiency can also result in deafness and a serious lack of energy in anyone affected because it impairs the function of the thyroid gland. **The World Health Organization is now increasing the recommendation for iodine intake, especially in pregnancy.**

Adding iodine to salt in the 1950s was undertaken to prevent the common serious health consequences of iodine deficiency in the US. There was a lot of advertising about choosing iodized salt. It appeared to solve the problem ... but circumstances have changed a lot since then.

One problem is that they chose salt as the agent to deliver iodine, but then we started advising people to not eat salt. Oops! For that reason, we need to find another way to assure adequate iodine intake by using a carrier other than salt.

Many people are not aware that if they live in a low-iodine region they should select "iodized salt." Most people were not around in the 1950s when this issue got all that initial attention, and it is no longer even on most people's radar. Additionally, the packaging is often very similar and they are side-by-side on the shelf at the store, so it is even easier to choose non-iodized salt by accident.



Another change: in the 1950s our mommies often stayed at home and cooked everything from scratch using the iodized form of salt that was being talked about a lot then on TV, radio and in newspapers. (We didn't even have cake-mix!) But now most people are not cooking "from scratch" ... or at all ... nearly as much and they are usually also unaware that **the sodium used in commercial food preparation is NOT IODIZED.** They think that eating that whole pizza last night provided plenty of iodine because it was really salty. Wrong.

Most of our high sodium intake is not from salting foods at the table, but from the high sodium content of many processed foods. But since the sodium used in food processing is not iodized, many people end up getting too little of this key nutrient.

Another factor in the increase in iodine deficiency is that specialty salts are popular now, like **sea salt or exotic salts ... but most are not iodized.** Additionally, **we frequently are advised to cut back on salt for other health reasons, which can further limit iodine intake.**

The choice of salt as the way to supplement iodine was made well before **ideas of the health benefits of sodium restriction** were common. So, because of the anti-sodium public health message, some people are proud to announce that "there is not even a salt shaker on my table!" But it may be that the only iodine their family might have at all is in that salt shaker on the table ... assuming they bought the iodized kind.

Another new factor contributing to our decreased iodine intake is the popular movement toward **buying and eating primarily locally grown foods.** It supports local farmers, results in fresher foods and decreases the cost and pollution of trucking things all over the US. This is a terrific trend. However, this also removes one more source of dietary iodine if one happens to live in **an area where the ground is low in iodine.** Plants grown there will not provide iodine, so assuring iodine adequacy some other way is necessary. (See map at the end of this paper.)

Because it has long been assumed that the large iodine deficiency problem was "solved" in the US by iodizing salt, **at present many vitamin pills contain no iodine at**

all, including many prenatal vitamins. So, this is one more nutrient that a person should check for when they select a multivitamin. Choose iodized salt if you use salt, and people who use little salt should be sure to find an iodine supplement especially if they live in the northern half of the country or other iodine-poor region. This can be quite simple to do if one chooses a standard multivitamin that DOES contain iodine.

The problem of iodine deficiency has simply not been in our radar for many years. This is a very newly recognized and extremely important health problem that needs attention. In some countries with naturally low iodine soil (like Australia, for example) the resurgence of this problem is now being addressed by a “Public Health” approach: **mandating iodine fortification of bread.** In other words, they **are no longer using salt as the agent that delivers the iodine**, so all the “don’t eat salt” issues that inappropriately limited iodine intake went away. It has been very successful. We may be looking into this kind of solution in the future.

[Iodine Content of prenatal multivitamins in the United States. NEJM. **2009**;360:939-940. Iodine deficiency in pregnancy and the effects of maternal iodine supplementation on the offspring: a review. Am J Clin Nutr. **2009** Feb;89(2):668S-72S. Iodine status of the U.S. population, National Health and Nutrition Examination Survey 2003-2004. Thyroid. **2008** Nov;18(11):1207-14.]

And finally:

Of course, taking a multivitamin does not take the place of eating healthy foods.

Do I even have to say this?

For example, the vitamin pills contain no protein, no omega-3 fats, and little or no beneficial phytochemicals, potassium, magnesium, selenium, chromium, calcium, phosphorus, etc. The people who design the pills assume that taking a multivitamin does not take the place of eating healthy foods. And as described, at present many products also contain little or no iodine or vitamin K. [I really hope I can remove this statement in the next update of this paper.] In any case, it is up to us to **eat more of the really great nutritious foods as described** in this paper.

For people who say that they “don’t believe in” taking a vitamin, I usually try to point out that nutrition is not a religion, so belief is not really a central issue. It’s a biological/biochemical science. At this time in history, the science indicates that it is advantageous to take a multivitamin, some fish oil, and for quite a few folks extra vitamin D, vitamin K and iodine **IN ADDITION TO eating lots of healthy nutritious foods.**

Bottom Line/Summary

- **Eat lots of healthy foods including plenty of:
brightly colored fruits and vegetables,
nuts, legumes, seeds, whole grains (baby plants) and
un-processed or minimally processed foods.**
- **Use mostly olive oil, peanut oil or other fats rich in monounsaturated fat
and omega-3 fats. Many new products are now available.**
- **Take a standard “complete-type” multivitamin with minerals.**
- **For many people, for many reasons, eating fish or taking
fish- or krill- oil supplements is advisable.**
- **Many people will also need extra attention to assure adequacy of:
Vitamins B12, D and K and the mineral iodine.**

MAPS of INTEREST: VITAMIN D and IODINE

Cathy Breedon

VITAMIN D: <https://www.health.harvard.edu/newsweek/images/latitude-vitaminD.jpg>

Except during the summer months, the skin makes little if any vitamin D from the sun at latitudes above 37 degrees north (in the United States, the shaded region in the map) or below 37 degrees south of the equator. People who live in these areas are at relatively greater risk for vitamin D deficiency.



(Actually, that's where I live ... but you can see why it's a really big deal Up North!)

Iodine: Map showing spatial correlation between the former "Goiter Belt*" in the northern U.S. and areas where the iodine content of drinking water is naturally low.

www.uwsp.edu/gEO/faculty/ozsvath/images/goiter_belt.htm

[*Goiter is an abnormal enlargement of the thyroid gland, often due to iodine deficiency.]

