Vitamin D Update

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In November 2010, the Institute of Medicine issued new guidelines regarding vitamin D supplementation. As the news about the health benefits of vitamin D have been widely reported in the media, there has been a huge increase in the number of blood tests to check vitamin D levels in the general U.S. population. Is it necessary for everyone to get tested? Let’s re-examine the role of vitamin D as we now understand it before attempting to answer that question.

Many of our grandparents remember that inadequate vitamin D caused rickets: a disease of the bony skeleton that caused limb deformity, mainly in children. Many foods were then fortified with vitamin D and rickets was no longer a problem, but it turns out that rickets is the tip of the Vitamin D deficiency iceberg. In fact, vitamin D deficiency remains common in children and adults, especially in those of us who live in places like Wyoming, where the winter is long.

So who is at risk for vitamin D deficiency? Potentially all of us, especially at this northern latitude. According to many studies, 40-100% of U.S. and European elderly men and women are deficient. You don’t have to be older to be at risk as well: children and young adults are also at potentially high risk, especially at the end of winter. We know that even the prenatal vitamin does not have adequate vitamin D, putting pregnant and lactating women also at risk.

So what happens if we don’t get enough vitamin D? The effects of inadequate vitamin D are currently best understood in bone health. In utero and during childhood, vitamin D deficiency can cause poor growth and deformities of the skeleton, even leading to an increased risk of hip fracture later in life. Without enough vitamin D, calcium will not be maximally deposited in the bones of the fetus or children, which is the beginning of rickets.

What about in adults? Without vitamin D, only 15% of dietary calcium is absorbed. This means you can take huge supplements of calcium but lose most of it through the gastrointestinal tract if you don’t have enough vitamin D in your system. When adults do not get enough of both calcium and
vitamin D the long term effect is bone loss, which in the long run leads to osteoporosis---the precursor to hip fractures.

Interestingly, osteoporosis does not lead to bone pain. However, vitamin D deficiency can cause something caused osteomalacia, and this is a known cause of isolated or generalized muscle aches and bone pain. One study showed that 93% of persons 10-65 years of age who were admitted to a hospital emergency department with muscle aches and bone pain had inadequate vitamin D in their systems.

Speaking of muscles, vitamin D deficiency causes muscle weakness. Our muscles have a vitamin D receptor and may need vitamin D for maximal function. In fact, vitamin D can improve muscle performance speed and strength as well as reduce the risk of falls, a great bonus for the elderly.

Osteoporosis and hip fracture is a hot topic, and I speak to patients literally daily about this issue. It is definitely a big problem in especially post-menopausal women. 33% of women 60-70 years of age and 66% of all Americans over 80 years old have osteoporosis. Almost half of all women in this country will break a hip at some point with a fall, and many of them will die within the year. This is a huge problem, and getting enough vitamin D could help prevent it. Most women are aware of that we need extra calcium, especially after menopause. But, many women don’t get enough vitamin D, and all that extra calcium that they are making the effort to take is not getting absorbed into their bodies.

Vitamin D deficiency is associated with a variety of other diseases as well, including autoimmune diseases such as type 1 diabetes, multiple sclerosis (MS), possibly heart disease, Crohn’s disease, and various types of cancer. Similar observations have been made for rheumatoid arthritis and osteoarthritis. However, the use of vitamin D in actual prevention of these diseases is still undergoing rigorous testing. Currently there is an ongoing large clinical trial involving 20,000 U.S. men and women. It is examining the role of vitamin D supplementation at the dose of 2000 IU per day for the prevention of cancer and heart disease, and hopefully at the conclusion of this trial we will have a better idea of whether or not we require higher doses of vitamin D to prevent these diseases.

Ok, so where do we get vitamin D? The primary worldwide source of vitamin D is exposure to sunlight. Solar ultraviolet B radiation penetrates
the skin and converts an inactive compound to pre-vitamin D3, a precursor for active vitamin D. Because excess vitamin D3 is actually destroyed by sunlight, excessive exposure to the sun does not cause vitamin D intoxication. So you can’t “O.D.” on vitamin D by spending too much time in the sun.

How much sun exposure provides adequate vitamin D? Exposure of the arms and legs for 10-30 minutes (depending on the time of day, season, latitude, and skin pigmentation) between the hours of 10 AM-3 PM twice a week is often adequate. You don’t need me to tell you that this is impossible for us living here in a colder climate with an extremely short summer. Also, even though this is easier to achieve if you live in Arizona or Costa Rica, it’s still difficult if you work inside all day on a regular basis.

Many of you will rightly ask, “What about skin cancer?” The key is what experts call “sensible exposure.” It is highly unlikely that 10-30 minutes, a few times per week, will lead to skin cancer, though people with fair skin are more at risk. So since it’s hard to regulate our sun exposure, and our colder climate is not that flexible, we need to resort to dietary supplements.

A major source of vitamin D is a diet high in oily fish, such as mackerel, salmon, and sardines. Unfortunately, few of the foods that we eat in this latitude naturally contain enough vitamin D, and most of us don’t eat oily fish five times a day. So how do we get the vitamin D we need?

As I mentioned at the beginning of this article, the Institute of Medicine has recently revised previous recommendations. The new guidelines recommend 600 IU (international units) per day for all persons aged 2-70, and 800 IU per day for persons with a high risk of osteoporosis or who are older than 70. They also state that the upper limit of intake is 4000 IU per day, which is rarely required. I personally recommend a slightly higher dosing in the range of 800-1000 IU per day, which is clearly not toxic, to all of my patients who are pregnant, breastfeeding, or postmenopausal.

What about the blood test for vitamin D? If you take regular supplementation, and have some degree of sun exposure, you don’t need to check a level. However, women with osteoporosis may benefit from blood levels. We know that a blood level less than 20 ng per milliliter is vitamin D deficiency, but further studies are required to work out the recommended level. Unfortunately, the implications of vitamin D levels below and just
above the normal reference range are incompletely understood. As more is known about this hot topic, the recommendations will likely evolve. Interestingly, vitamin D levels in general are higher during the summer months.

Excessive exposure to sunlight, especially sunlight that causes sunburn, will increase the risk of skin cancer. Therefore, a supplement of at least 600 IU per day and sensible sun exposure are the minimum needed to fulfill the body’s vitamin D requirements. And, we may determine once and for all that vitamin D helps to prevent heart disease and cancer. If this is the case, the recommended dosing will likely increase. At least there are some great health reasons to spend more time in the sun!