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Watch Out! Vitamin D Build-up in Fat can be Toxic: The toxicity debate (Pt. 1)

Published on June 5, 2020

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Yesterday, we addressed our first vitamin D myth – that, being fat soluble, [vitamin D can be stored in our fat cells for later use](#). We have heard concerns that supplementation with vitamin D is not needed, or even safe, because of this. While it is true that vitamin D has a higher affinity for fat, the ratio of vitamin D in fat to blood is relatively constant, and the body does not rely on vitamin D in fat to increase vitamin D blood levels. Nor is it possible to get vitamin D3 itself without regular intake from supplements or food, or from proper sun exposure.

Toxic Vitamin D in Fat?

Since vitamin D has a higher affinity for fat, some have speculated that vitamin D can build-up in our body fat over time and become toxic. Hopefully, our last post helped put that thought to rest, by demonstrating the constant ratio of vitamin D in fat to blood.

Additionally, the question has been raised that individuals who are overweight and obese might be at particular risk when taking vitamin D supplements of vitamin D toxicity if they lose a large amount of weight in a short period of time. Yet, this is simply not true. Overweight and obese individuals are one of the most at-risk groups for vitamin D deficiency and associated health problems. In fact, they typically need 2 to 3 times the amount of vitamin D intake as do people in the normal body mass index range. Rather than worrying about toxicity, the more appropriate concern would be about deficiency.

Today's post adds additional evidence to dispel the myth that vitamin D stored in fat can lead to toxicity.

[Here for a good time, not a long time](#)



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Vitamin D build-up in body fat does not continue indefinitely. When there is a continuous supply of vitamin D, [a balance is reached between the vitamin D stored within our body fat and its removal for use into the blood stream.](#)

In a review of vitamin D storage in pig tissues Dr. Robert Heaney and colleagues from Creighton University discovered that groups with vitamin D blood levels near 36 ng/ml (90 nmol/L) use up their vitamin D just as fast as they are getting it. In fact, pigs given feed with over 2,000 IU/d only had a 7 to 12 day supply of vitamin D in their body. This means that they are using the vitamin D as they get it – there is ongoing turnover and essentially no storage occurring.

In cases of adequate vitamin D intake, some gets stored in body fat, but this breaks down over time. It is not stored indefinitely.

False Flood Alarm

Suggestions that rapid fat loss could result in a sudden flood of vitamin D – or any other fat soluble vitamin for that matter – into the bloodstream are also unsupported.

A 2013 study by Piccolo et al. centered on overweight participants in a weight-loss program found [no change in vitamin D blood levels after an average total fat loss of 13%](#). Weight loss did not change vitamin D levels.

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Studies on weight loss surgery also show that vitamin D is not rapidly released from the fatty tissues. The chart above, from a [2012 study by members of Boston University School of Medicine](#), shows the vitamin D blood level of 17 subjects who were followed for an entire year after undergoing a weight loss procedure. After a year the average weight loss was 130 lbs and 90 lbs of fat. As can be seen, there was no increase in vitamin D blood levels despite such a dramatic loss of fat.

Clearly, vitamin D in your body fat does not lead to high levels of vitamin D in your blood after dramatic weight loss.

What doses of vitamin D can be considered safe?

“Normal” vitamin D levels are those that you can [attain naturally through sun exposure](#). The best evidence for normal levels comes from native groups at the equator (can make vitamin D all year) and living a traditional lifestyle (plenty of time outdoors and they don’t wear sunscreen). Their blood levels of vitamin D are around 46 ng/ml (115 nmol/L).

While the current guidelines set by the U.S. National Academy of Medicine (formerly the Institute of Medicine) recommend 600 IU/day of vitamin D, with an upper limit of 4,000 IU/d, this is not enough for many to reach the levels



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- AA:EPA Ratio
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- Breast Cancer
- C-reactive Protein (CRP)
- Cadmium
- Cancer
- Children
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- Coronavirus (COVID-19)
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- Elements Panel
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- Heart Health
- Hemoglobin A1c (HbA1c)
- Immune Health
- Inflammation
- Lead
- Magnesium
- Mental Health
- Mercury
- Multiple Sclerosis
- Nutrition & Supplements

suggested above.

Is there additional concern for toxicity when supplementing with more than 600 or 4000 IU/day of vitamin D? When should you be concerned? Stay tuned and find out!

Is it True?

Our goal with this “Vitamin D Myths” series is to provide information and resources to answer the question, “Why should I care about vitamin D?” and to help dispel the myths and misconceptions surrounding it that may be preventing you and others from accepting it as an essential component to health. We will also discuss other nutrients essential to the function of vitamin D (and vice versa) within the body that should not be ignored.

Vitamin D is necessary for multiple functions within the body and should not be ignored, but has the hype about vitamin D and its role in the body’s response to COVID-19 been over-exaggerated? What concerns about vitamin D are valid, and which are not? We want to provide you with evidence-based information to help you decide what vitamin D action to take, if any, for your own health.

We want to hear from you!

Is there a particular ‘myth’ you have heard about vitamin D? Or, something you have read or been told that makes you question whether vitamin D ‘deserves’ so much attention? Or whether you should be taking it and how much? Share with us by emailing jen@grassrootshealth.org what you have heard that makes you question vitamin D so that we can consider addressing it in our newsletters.

Do you know your nutrient status?

Do you need to be concerned about getting more vitamin D or other essential nutrients, such as magnesium, omega-3s and zinc? [Test today](#) and take the necessary steps to ensure your body has enough of each to support daily health!

We’re in a time of great crisis that could be greatly affected by making sure you and everyone you know has a serum level of at least 40 ng/ml. Help us help you.

Give your immune system the nutrients it needs to support a healthy you and protect yourself from unnecessary diseases.

GrassrootsHealth Nutrient Research Institute is preparing to do a Community RCT with the use of our myData-myAnswers nutrient health system that over 15,000 people are already using for their health. We will demonstrate how one can use the Nutrient Research Model established by Dr. Robert Heaney to establish the effect of vitamin D serum levels of at least 40 ng/ml (100 nmol/L) on risk reduction with different ethnicities in the population. Please let us know if you’re interested in helping sponsor this project.

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Watch Out! Too Much Vitamin D can be Toxic: The toxicity debate (Pt. 2)

Published on June 8, 2020



URGENT:

There is an attack on the current scientific knowledge of vitamin D and its usefulness for our health.

Help us continue to spread the TRUTH about vitamin D!

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Our vitamin D myth busting series continues, with our last post dispelling the [myth that vitamin D can be stored in our fat cells](#) for later use and [can become toxic](#). While it is true that vitamin D has a higher affinity for fat, there is a relatively constant ratio of vitamin D in fat to blood, and the body does not rely on vitamin D in fat to increase vitamin D blood levels, nor is build-up of vitamin D in fat tissues a concern for toxicity.

However, there is always concern about toxicity when taking in anything in excessive doses. Even drinking too much water can throw our system out of whack and become toxic, even fatal – a condition known as water intoxication or hyponatremia.

When should you be concerned about vitamin D toxicity?

Vitamin D toxicity is rare and usually caused by excessive vitamin D supplementation, which can lead to hypercalcemia (increased calcium in the blood), hyperphosphatemia (increased phosphate in the blood), and suppressed serum PTH concentrations. Symptoms include vomiting, nausea, abdominal pain, fatigue, and weakness. Most cases of vitamin D toxicity have been related to supplement manufacturing and labeling errors, as well as overdosing (seen in some cases with intakes of 50,000 IU/day or more over an extended period of time such as six months or longer), or over-correction of vitamin D deficiency (seen with intakes of about 77,000 IU/day for two months).



Currently, the U.S. National Academy of Medicine (NAM, formerly the Institute of Medicine) has set their recommended daily allowance of vitamin D at 600 IU/day, their upper intake level at 4,000 IU/day, and their no adverse effects level (NOAEL) at 10,000 IU/day. However, the vast majority of the population will not reach a vitamin D level of 40-60 ng/ml (100-150 nmol/L), the range recommended by the [GrassrootsHealth panel of 48 vitamin D researchers and scientists](#), if taking only the daily recommended amount of 600 IU/day. Looking at a starting serum level of 20 ng/ml (close to the population average), an intake of at least 3,300 IU/day would be sufficient for only 50% of adults to achieve a level of 40 ng/ml or greater. Some will require more; at least 4,700 IU/day would be sufficient for 90% of adults to achieve 40 ng/ml

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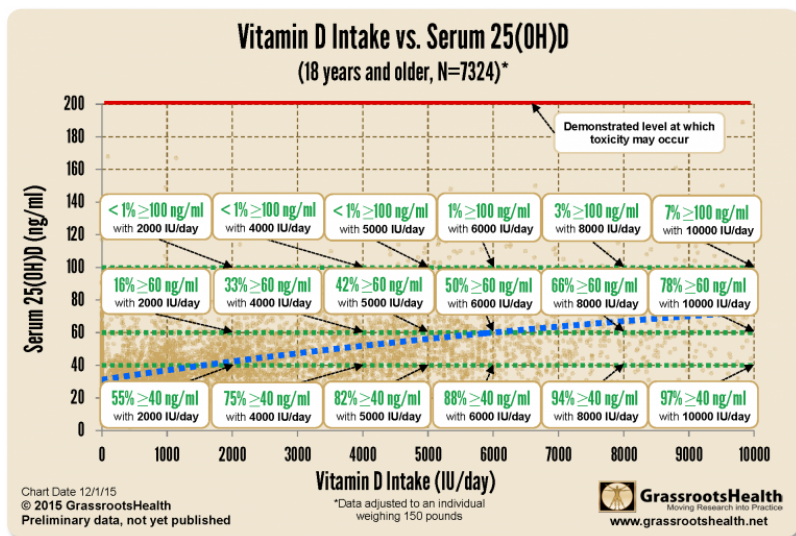
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or greater. These intake levels may seem high compared to the recommendations made by the NAM, leading to concern from individuals who are not aware of the wealth of vitamin D research demonstrating its safety.

How much vitamin D can cause toxicity?

The chart below shows a plot of the vitamin D serum levels as a function of reported vitamin D intake amounts from the GrassrootsHealth cohort, adjusted to an individual weighing 150 pounds. The dotted blue line is the best fit line through the data.



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Shown on the figure are the percent of participants who are at or above 40, 60, and 100 ng/ml for various vitamin D supplement intake amounts. Fewer than 1% of participants have vitamin D levels ≥ 100 ng/ml resulting from an intake of 6000 IU/day or less, and no participants reached a level above 200 ng/ml, the demonstrated level at which toxicity may occur (Hathcock et al.), as illustrated by the red line at the top of the chart. Hathcock et al. also observed no toxicity in studies reporting a daily vitamin D intake below 30,000 IU/day.

A study published by McCullough et al. describes the results of routine vitamin D testing and supplementation among all patients admitted to a state psychiatric hospital in Cincinnati, Ohio. Patients received vitamin D supplementation at either 5000 IU/day (group 1) or 10,000 IU/day (group 2), for 12 months or longer. Average baseline vitamin D levels among patients were 24-25 ng/ml. Doses ranging from 20,000 to 60,000 IU/day were used in individual cases for patients with psoriasis, asthma, and skin cancer. Serum calcium and parathyroid hormone (PTH) levels were also measured and tracked to identify potential cases of vitamin D toxicity. There were no adverse events related to vitamin D supplementation and no cases of vitamin D induced hypercalcemia were observed in any patients.

It is important to remember that a single dose of mid-day sunshine, known as an "erythema dose," can produce roughly 10,000 to 25,000 IU of vitamin D. A minimal erythema dose is defined by a pinkness of the skin about 1-6 hours after sun exposure, going away within 24 hours. There is no single erythema dose or sun exposure time recommendation, due in part to varying sun intensity as well as differences in skin type and other individual differences in vitamin D production.

What else to consider?

Individuals with certain conditions, such as primary hyperparathyroidism, sarcoidosis, tuberculosis, and lymphoma, may be hypersensitive to vitamin D supplementation and may need to be more cautious when supplementing, or work with a health care provider.

Another concern, which we will address soon, is that **taking too much vitamin D without co-nutrients may create imbalances – this is what makes adequate intake of co-nutrients, either from diet or supplements, so very**



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important. [Stay tuned!](#)

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Know if you are getting enough vitamin D and other important nutrients

Vitamin D, along with magnesium, zinc, and omega-3s, are just a few nutrients vital to maintaining our health. To know if you are getting enough of these nutrients, make sure you [test today!](#)

Are You Getting Enough Vitamin D to Help Yourself?

We’re in a time of great crisis that could be greatly affected by making sure you and everyone you know has a serum level of at least 40 ng/ml. Help us help you.

Do you know what your vitamin D level is? Be sure to [test today](#) to find out, and take steps to keep it within a target of 40-60 ng/ml or 100-150 nmol/L! Give your immune system the nutrients it needs to support a healthy you and protect yourself from unnecessary diseases.

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