

Supplement Sampler

Vitamin D (First a vitamin, then a hormone)

Consider Deficiency:

- Heart Disease
- Muscle weakness/fatigue
- Neurodegenerative Disease (MS = ↑ prevalence in northern latitudes)
- Osteoporosis/penia
- Cancer (Colorectal and Prostate, ↑ Prostate Cancer in dark skinned males related to low vit D)
- Obesity (Sub Q fat sequesters vitamin D)
- Elderly (less sun exposure and less conversion in skin)
- Institutionalized and home bound
- Homes far from the equator (↑ deficiency > 40 degrees latitude. That's north of Iowa)
- Rx: anticonvulsants (Including gabapentin (*Neurontin*) & pregabalin (*Lyrica*), HIV meds, organ rejection drugs, steroids and calcium supplementation.

Mechanism of Action

There are two major forms of vitamin D, ergocalciferol (D₂) and cholecalciferol (D₃). Ergocalciferol is found in plants and cholecalciferol is produced in the skin by UVB radiation. Vitamin D is stored in the liver as 25 hydroxy vitamin D or 25(OH)D. The kidney then converts this into active hormone 1,25 dihydroxyvitamin D or 1,25(OH)₂D that influences many organ systems including the endothelium, heart, bones, immune and nervous system among others. When stores of vitamin D in the liver become low, the kidney will make more 1,25 hydroxy vitamin D. Thus this form should not be used for checking vitamin D status since it will not adequately represent levels. 25 hydroxy vitamin D is the best test to monitor for deficiency unless you want to see if the kidney is adequately converting vitamin D to active hormone. This is rarely necessary.

Best month to check for vitamin D deficiency: FEBRUARY

Best Studies

There are many studies supporting the benefits of vitamin D. A good recent review from the Journal of the American College of Cardiology:

John H. Lee, MD, James H. O'Keefe, MD, David Bell, MD, Donald D. Hensrud, MD, MPH, Michael F. Holick, MD, PHD. Vitamin D Deficiency: An Important, Common, and Easily Treatable Cardiac Risk Factor. JACC. Vol. 52 (24). 2008.



Vitamin D

Dose

Sunlight:

↑ skin pigment = ↑ sunlight needed=45 mins non-burning mid-day sun exposure 2x/wk

↓ skin pigment = ↓ sunlight needed=15 mins non-burning mid-day sun exposure 2x/wk

10 mins of mid-day summer sun = 3000 IU D₃

During winter, the sun is lower on the horizon with UV rays more at an angle and too weak to convert Vit D. Supplementation is often necessary during these months.

Sunblock with an SPF of 15 will block 99% of vitamin D production in the skin.

Note: Our dermatology colleagues recommend supplementation over sun exposure. We believe the benefits of sunlight (for whole body health) far outweigh the risk of skin cancer when sunlight is used therapeutically without burning to increase vitamin D, elevate mood, benefit circadian rhythm and to prevent nature deficit syndrome!

Food

Eating cold-water fish provides both a good source of vitamin D & omega-3 fatty acids.

Food	Vitamin D
Cod Liver Oil	1,360 IU/Tbsp
Wild Caught Salmon	600-1,000 IU/3 oz
Farm Raised Salmon	100-250 IU/3 oz
Tuna Fish	200 IU/3 oz
Fortified Milk/Orange Juice	100 IU/glass

Supplementation

Ergocalciferol (D₂) or cholecalciferol (D₃) can be used for supplementation. Both forms will raise levels but D₃ appears to sustain higher levels after a bolus.

Deficiency: Use 50,000 IU of D₂ (prescription) weekly for 8 weeks and then give maintenance dose. (Consider re-checking level.) Or you can start by giving daily maintenance dose of D₃ per the chart below.

Maintenance: 50,000 IU D₂ every TWO weeks or 1000-2000 IU D₃ daily.

Pediatric Dosing: Go outside and play! 400 IU/day is recommended for newborns (APA Recs). It comes in 400 IU/drop. Raising levels in mom = ↑ levels in breast milk.

Daily dosing for replacement and maintenance for D₃ (Ages >10)

25 Hydroxy Vit D Level	D ₃ Dosage
<10 ng/ml	5000 IU
11-20 ng/ml	3000 IU
21-30 ng/ml	2000 IU
30-100 ng/ml (nl)	1000 IU (Maintenance)
> 100 ng/ml	None
>150 ng/ml	Toxicity



Vitamin D

Dosing Pearls:

- 1000 IU daily will raise levels about 10 pts
- For resistant cases (still low on 50,000 D₂ weekly), use sunlight, oily fish (cod liver oil one tbsp daily) and combine both D₂ and D₃ (e.g. 50,000 IU D₂ weekly with 2000-3000 IU of D₃ daily)
- Many will only need supplementation during the winter months.

Side Effects

Doses > 10,000 IU daily can result in renal calculi and hypercalcemia causing renal insufficiency, fatigue and weakness. It is impossible to become vitamin D toxic from sun exposure.

Cost

#250 capsules of 1000 IU of D3 = \$10

Something to Ponder

Intake of too much calcium (supplementation or in the form of dairy) can lower vitamin D levels. This has been associated with a higher incidence of PC in men. (*Health Professional's Follow-Up study*) Men at risk should not supplement with calcium. One may wonder if the future will teach us that calcium supplementation increases the risk of other cancers as well.

Brought to you by your colleagues in the UW Department of Family Medicine Integrative Medicine Program.

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