

Vitamin D Imbalance - Part Four

Skin types for vitamin D synthesis from UV rays

Skin Type	Skin Color	Skin Characteristics
I	White; very fair, red or blond hair, blue eyes, freckles	Always burns, never tans
II	White; fair, red or blonde hair, blue, hazel or green eyes	Usually burns, tans with difficulty
III	Cream white; fair, with any eye or hair color, very common	Sometimes mild burn, gradually tans
IV	Brown; typical Mediterranean Caucasian skin	Rarely burns, tans with ease
V	Dark Brown; mid-eastern skin types	Very rarely burns, tans easily
VI	Black	Never burns, tans easily

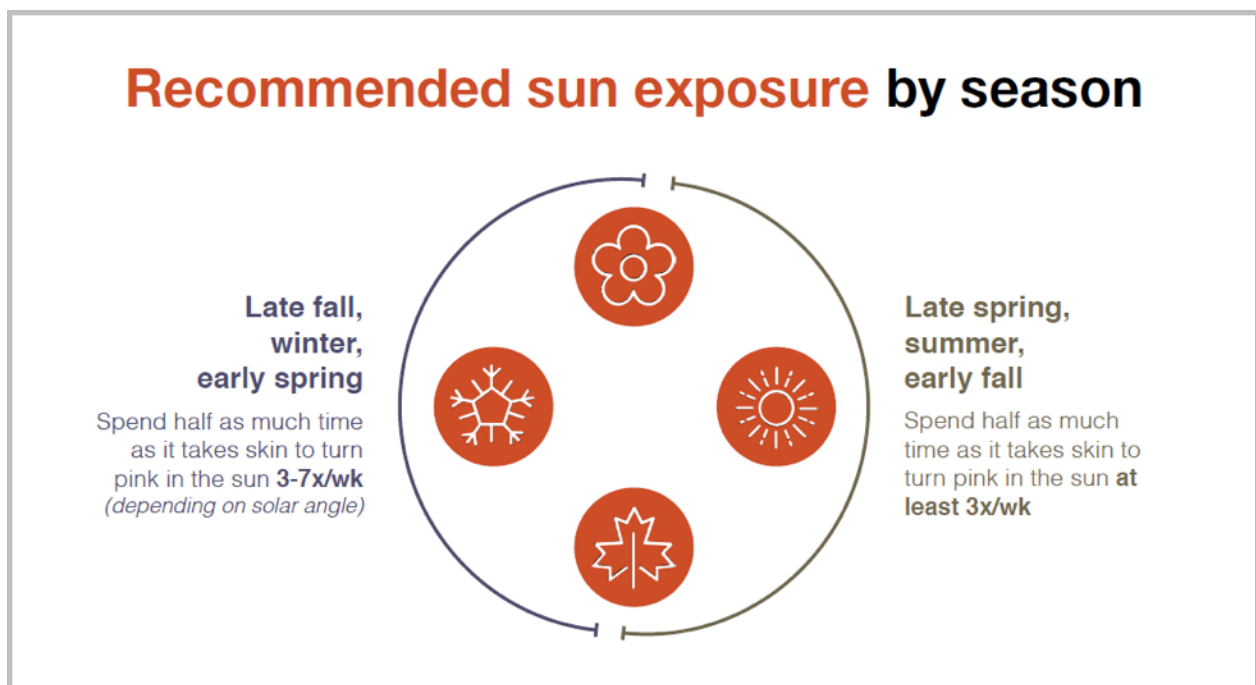
As a general rule, full-body exposure to midday summer sun will produce roughly 10,000 IU of vitamin D in about half the time it takes for your skin to turn pink. Now, depending on skin tone, this could be as little as 15 minutes in someone with pale skin, types I to III on the chart on the slide, but these numbers are best-case scenario. At higher latitudes, with less skin exposed, and with darker skin color such as types IV through VI, much less vitamin D will be produced.

For example, approximately 15 minutes of exposure of the face, neck, hands, arms, and legs, covering about 60 percent of the body, to sunlight in Boston at the end of March produces only about 4,000 IU in people with fair skin, whereas someone with dark skin such as type V would need to spend 42 minutes in those conditions to obtain the same amount of vitamin D.

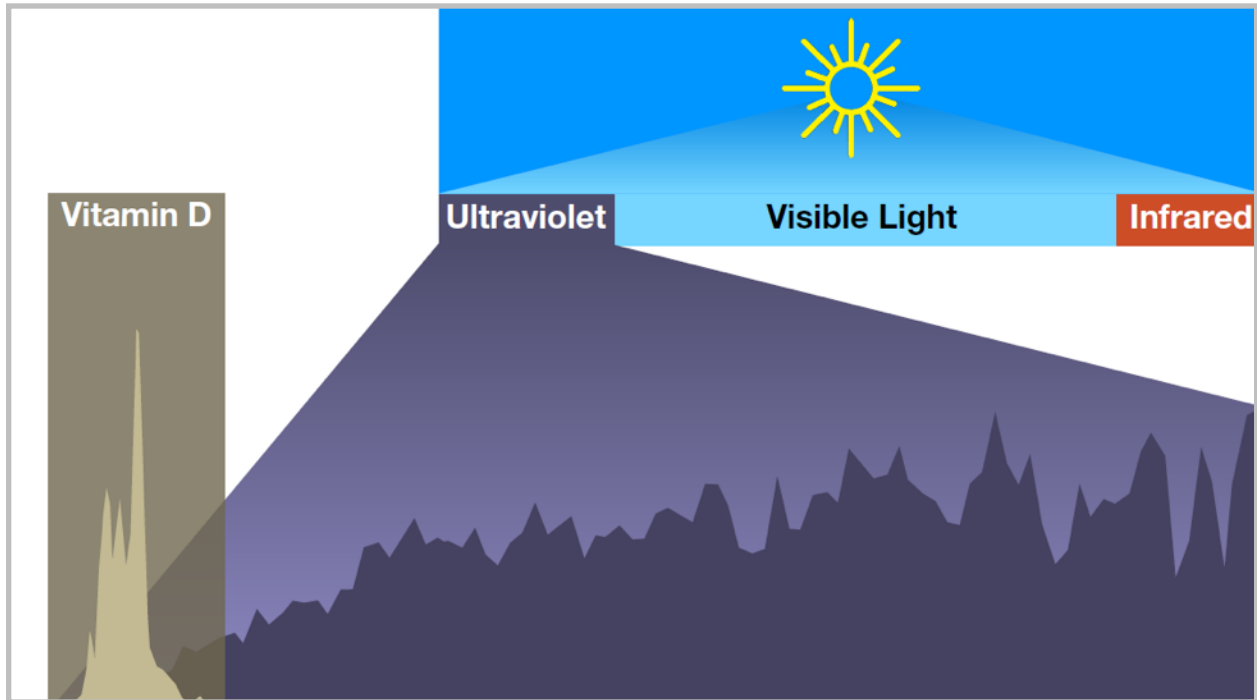
Just as it can be difficult to find the right dose of vitamin D that keeps 25(OH)D in the optimal range without the risk of toxicity, it can be hard to find just the right dose of UV exposure or sunlight without the risk of sunburn and skin cancer. There is no doubt that excess sun exposure can lead to sunburn and is linked to skin cancer. In an effort to reduce the incidence of skin cancer, many dermatologists are recommending the use of sunscreen. Unfortunately, sunscreen also prevents the cutaneous production of vitamin D₃ and other beneficial effects of sun exposure. Furthermore, sunscreens prevent sunburn generated by excess exposure to UVB, but they still allow UVA skin damage to occur, and this is the primary reason sunscreen use is a contributing factor to malignant melanoma, which is the deadliest form of skin cancer.

What about tanning beds? Back in the 1970s, tanning beds were created more to mimic sun exposure, so they had a combination of UVA and UVB. However, most tanning bed manufacturers have moved toward almost exclusive UVA, like 98 to 99 percent, and these are even more risky when it comes to sunburn, and many studies show that they are causing skin cancer. Most tanning bed operators are not well educated on the harmful effects of sunburn, and for this reason, I don't recommend tanning beds as a source of UV exposure.

With all of this in mind, how much time should you spend in the sun each week? It's difficult to make a generic recommendation, again, because there are so many variables that affect the conversion of ultraviolet light to vitamin D, including skin type, season, time of day, latitude, age, and health status. However, here are some rough guidelines.



During the late spring, summer, and early fall, spend half as much time as it takes your skin to turn pink in the sun at least three times a week. During the late fall, winter, and early spring, you have to measure vitamin D levels and see where they are. If they are deficient, and if you live at a latitude where the solar angle is unlikely to provide much benefit, consider spending half as much time as it takes your skin to turn pink three to seven times a week, depending on the solar angle. Unfortunately, in some cases, sunlight isn't a viable route of UV exposure for various reasons, such as people who work indoors, latitude, or season.



At the time of this recording, new technology is being developed to provide UV exposure in a narrow UVB spectrum of 300 to 302 nm. This is a spectrum with maximum benefit and minimal risk. You'd spend two minutes in the booth and get a month's worth of vitamin D and sun exposure benefit with the risk that is associated with only 53 seconds of actual sun exposure. These booths may end up in your doctor's office or CrossFit gyms, nursing homes, and even drugstores, so stay tuned to my blog for updates.

Most people who follow the recommendations I just offered for food, including cod liver oil and ultraviolet light exposure, won't need to take additional vitamin D supplements. However, not everyone will have enough access to either sunlight or these specialized UV booths throughout the year, especially given that the booths aren't available yet, and some people are allergic to fish, cod liver oil, and eggs. In these cases, vitamin D supplements can be used to make up the shortfall.

Vitamin D supplementation considerations

- 1 Take with fat for maximum absorption
- 2 D3 better absorbed than D2
- 3 Dose should be adjusted by weight and inflammatory/gut status
- 4 Weekly or daily dosing similar; large monthly or semi-annual doses not recommended

There are several important things to keep in mind about vitamin D supplementation. First is that vitamin D is fat soluble, which means that it should be taken with a meal that contains fat to improve absorption. Second, there are two supplemental forms of vitamin D available: D2 and D3. Some research suggests that D3 supplements are more effective at raising and maintaining 25(OH)D levels. Third is that individual response to vitamin D supplements varies. I've found in my practice that some people efficiently absorb vitamin D from supplements, while others, particularly those with digestive issues, absorb very little and thus need a higher dose to stay in the optimal range. Vitamin D dosage should also be adjusted by weight. Those who are obese may need to increase the doses that I recommend by as much as 50 percent in order to achieve the target 25(OH)D level. Fourth, the increase in serum vitamin D is similar regardless of whether you take a smaller dose of oral vitamin D daily or a larger dose once a week. However, super-large monthly or semiannual doses are not recommended, so choose whichever dosing schedule the patient is more likely to follow through with.

Vitamin D supplementation should be individualized.

How do you determine whether you need a vitamin D supplement? Given all the variables we've discussed, such as the differences in conversion of calcidiol to calcitriol, production of vitamin D from ultraviolet light, and the absorption of vitamin D from food and supplements, the only way to know for sure how much vitamin D you need is to test blood levels, change the vitamin D regimen, and then test again three to four months later to determine if it had the desired effect.

I've created a three-step process for my patients to determine their optimal level, and I suggest you follow it as well.

Next steps based on 25(OH)D levels

25(OH)D level (ng/mL)	Suggested action
<25	Begin treatment
25–35	Use PTH to determine whether treatment is necessary
>35	No treatment necessary; continue diet & lifestyle for maintaining adequate vitamin D

Okay, so these are the next steps based on the patient's 25(OH)D levels. If their 25(OH)D level is below 25 ng/mL, then you would begin treatment. If their level is between 25 and 35, then you could use PTH, parathyroid hormone, to determine whether treatment is necessary, and if their level is above 35, no treatment is necessary in most cases. They can just continue their diet and lifestyle protocol for maintaining adequate 25(OH)D levels.

However, if the time of year is fall or early winter, it may make sense to take a half-teaspoon per day or even a teaspoon per day of cod liver oil and then retest in 60 days to be sure that deficiency isn't developing, given the time of year.

Treatment based on outcome of Step One

25(OH)D level (ng/mL)	Suggested action
<15	1 tsp/d EVCLO, diet/UV exposure, plus 10,000 IU/d D3
15–25	1 tsp/d EVCLO, diet/UV exposure, plus 5,000 IU/d D3
26–35 with PTH >30	1 tsp/d EVCLO, diet/UV exposure
26–35 with PTH <30 >35	No treatment necessary; continue diet & lifestyle for maintaining adequate vitamin D

The next step is to begin treatment if their level was below 25, and what treatment you do depends on what their level was. If their level was below 15, which is a pretty significant deficiency, you would advise them to eat one pound of cold-water fatty fish such as salmon, herring, mackerel, or sardines; six to eight egg yolks per week, pasture-raised; one teaspoon of extra-virgin cod liver oil; UV exposure, as possible; and then 10,000 IU per day of micellized vitamin D, which is the most absorbable form. It's a liquid form that is predigested.

You may wonder why I advise eating fish, egg yolks, and all this other stuff instead of just telling them to take a vitamin D supplement, which is a whole lot easier. As you surely know by now, food is the best source of nutrients, and the reason for that is that there are various cofactors that are required for the absorption of certain nutrients that are present in food that are not present in synthetic supplements. Eating fish and taking cod liver oil gets patients these cofactors and also these other synergistic fat-soluble vitamins that work together with vitamin D, such as vitamin A, in the case of cod liver oil. It's really important to get some food-based sources of vitamin D, even if their vitamin D levels are really low like this, to help them better process the higher dose of vitamin D supplement you're going to give them.

If their level was 15 to 25, then you would do everything that I just mentioned except you would use 5,000 IU of vitamin D3 in micellized form. If their level was 26 to 35, and their PTH was above 30, that would indicate deficiency, but it would be milder than the previous two cases, so you could just try extra-virgin cod liver oil, diet, and UV exposure and see if you can bring it up that way. If the level is 26 to 35 with PTH below 30, or above 35, then no treatment is necessary, and you can continue diet and lifestyle for maintaining adequate vitamin D levels.

Treatment based on outcome of Step Two

25(OH)D level (ng/mL)	Suggested action
<15	1 tsp/d EVCLO, diet/UV exposure, consider D3 injections
15–25	1 tsp/d EVCLO, diet/UV exposure, plus 5,000-10,000 IU/d D3
26–35 with PTH >30	1 tsp/d EVCLO, diet/UV exposure
26–35 with PTH <30 >35	No treatment necessary; continue diet & lifestyle for maintaining adequate vitamin D

Step three is to retest 25(OH)D levels and PTH levels after 60 days. This, unfortunately, is a step that many clinicians omit, and it's really crucial to see what effect your treatment is having and also to check in with the patient and make sure they are not taking excess vitamin D because this, as I mentioned earlier, can lead to toxic levels of vitamin D, and it's something I'm seeing increasingly frequently in my practice. When you do the retest, your suggested action for what you do after that depends, of course, entirely on what their level is on the retest. If they are still below 15 after everything you did in the last step, it's very likely that they have an absorption problem, especially if you use micellized vitamin D and their level didn't come up. That's extremely rare. I've only seen it a couple times in almost a decade. In that case, the patient may need vitamin D injections, or they may need UV exposure from one of these new devices that are coming online soon in the next couple of years if they are unable to absorb oral vitamin D, or they have really severely impaired absorption.

If their level was below 15, and it came into the 15 to 25 range, you would use the same recommendations from the last slide, and the dose of vitamin D supplement could be 5,000 to 10,000 IU per day, depending on where they are. If they are maybe in the 15 to 20 range, you would use 10,000. If they are in the 20 to 25 range, you could use 5,000.

If they are 26 to 35 with PTH above 30, they are still deficient, but you could probably handle it with extra-virgin cod liver oil, diet, and UV exposure. If they are 26 to 35 with PTH under 30 or above 35, you've accomplished what you set out to accomplish, and no treatment is necessary.

Now note that you may need to retest at least twice a year, after spring and in the fall, to determine what their natural 25(OH)D levels are at different times of the year, and this is particularly important the further away from the equator you get because of the lower solar angle in higher northern and lower southern latitudes, or if the patient has a seasonal lifestyle where they spend a lot more time outdoors at a particular time of year.

25(OH)D range for autoimmune disease: 45–60 ng/mL

Note that some evidence suggests that it is beneficial to maintain D3 levels in the higher end of the 35 to 60 ng/mL range in cases of autoimmune disease. If your patient has an autoimmune disease, consider diet, UV exposure, and supplementation until they reach somewhere between 45 and 60 ng/mL level. If symptoms and other lab markers improve, this becomes the new target range for that patient.

Also note that phototherapy, or UV exposure, is superior to supplementation for patients with autoimmune disease. As mentioned, UV exposure has many benefits that vitamin D and food or supplements don't have, including production of cGRP, substance P, ACTH, MSH, calcitriol, and beta-endorphin. One study found that multiple sclerosis severity score had a stronger inverse association with frequent sunlight exposure than vitamin D consumption. Similarly, MRI measures of neurodegeneration in MS are associated with summer sun exposure independent of 25(OH)D levels. One study determined low infant sun exposure was associated with a twofold increase in type 1 diabetes. Seasonal variation and duration of sun exposure are both correlated to disease activity in patients with rheumatoid arthritis. The duration of sun exposure is inversely correlated to the incidence and severity of disease activity in Crohn's disease patients, and another study with MS patients discovered higher levels of reported sun exposure rather than 25(OH)D levels were associated with less depressive symptoms and less fatigue.

Phototherapy is also used as a treatment for certain skin disorders such as psoriasis. Keep an eye out, again, on my blog and podcast. I'll be sharing new developments in phototherapy that are coming down the pipeline. These can be a great option for patients with these conditions.

All right. That was a lot, I know. Probably pretty confusing and dense. You many need to listen to this or watch this one a couple of times and read the transcripts, but I'm really excited about this as a more sophisticated and individualized, nuanced way of determining optimal vitamin D status for our patients. All right, thanks for watching and listening, and we'll see you next time.