Preparing Patients for Proper Sun Exposure

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Disclosure: *Joel Kreisberg, DC, is an employee of Practice Greenhealth, a membership and networking organization for institutions in the healthcare community that seek to maintain sustainable, ecofriendly practices.*

The times of extended, unprotected sunbathing on the beach have long since passed. The current hyper media focus, with many years of messages about the increased incidence of skin cancers and the dangers of overexposure to the damaging rays of the sun, has created the dominant perspective of sun avoidance. However, recent headlines about decreases in vitamin D levels throughout our population require health professionals and their patients to rethink our relationship with the sun, which is our greatest natural source of vitamin D. Headlines such as "Vitamin D Often Low in Mothers and in Newborns,"[1] "Vitamin D Levels Low Among People in U.S., Particularly Those With Darker Skin, Study Finds"[2] and "Insufficient Vitamin D Levels in Americans"[3] have become increasingly commonplace. Several of these headlines are based on research published in the *Archives of Internal Medicine* by Adit A. Ginde, MD, MPH.*

Sun and Vitamin D

Is there a connection between lowered vitamin D and not having enough time in the sun? We all now know the answer to that is an unequivocal *yes*. What may not be so well known is that green health and the practice of green healthcare actually require a healthy relationship with the sun. Indeed, time in the sun is green medicine because it decreases the body's need for supplemental vitamin D and all the manufacturing, packaging, and carbon footprint that involves. In addition, as a person's own melatonin kicks in from repeated sun exposure, there is less need for environmentally impactful sunblocks when the person stays out for a longer time.

What do we know about exposure to direct sunlight and our health? How much direct sun does a person really need? The best known benefit of sunlight is its ability to supply vitamin D as 1,25-dihydroxyvitamin D_3, which is involved with more than 1000 different genes and regulates an aspect of almost every tissue in the body, most significantly calcium metabolism and neuromuscular and immune functioning. As the medical literature states, vitamin D is synthesized in the skin by exposure to ultraviolet B (UVB) radiation. (Sunlight is 95% ultraviolet A and 5% UVB.) This means that in 30 minutes, a light-skinned person in a bathing suit, when out in the midday summer sun, will produce some 50 000 IU of vitamin D in the next 24 hours. Since melanin reduces UVB radiation exposure (a healthy adaptation), a tanned or naturally darker-skinned individual yields, 20 000 to 30 000 IU in 30 minutes; for very dark-skinned individuals, only 8000 to 10 000 IU of vitamin D is produced.

Resources

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This naturally occurring vitamin D_3 then further undergoes a transformation within the liver and kidneys to its major usable form of vitamin D, 25-hyrdoxyvitamin D, which accumulates in the small intestines and acts as a hormone. It enhances calcium and phosphorus metabolism and regulates bone growth; for example, vitamin D maintains the serum calcium and phosphorus levels that support many metabolic functions and neuromuscular transmissions as well as produces bone mineralization. Lack of vitamin D in children leads to characteristic bone deformities such as bowed legs. Studies indicate that normal vitamin D levels in adults range from 20 to 60 ng/mL for 25-hyrdoxyvitamin D (not vitamin D_3). Dr Ginde's research used a minimum of 30 ng/mL for 25-hyrdoxyvitamin D.

Other health benefits of sunlight include the following:

- healthy immune suppression that can help prevent autoimmune diseases;
- increases in alpha melaocyte-stimulating hormone, which limit DNA damage resulting from UV radiation;
- increases in calcitonin gene-related peptide, which modulates several cytokines and helps the development of immunological tolerance;
- increased release in neuropeptide substance P, which increases lymphocyte proliferation and chemotaxis; and
- increases in endorphins, important in a healthy stress response.[4]

*For more information see the following: Ginde AA, Liu MC, Camargo CA Jr. Demographic differences and trends of vitamin D insufficiency in the US population, 1988-2004. *Arch Intern Med*. 2009;169(6):626-632.

The Truth About Sun Exposure

As early as the 1930s, public health officials in the United States began warning citizens to limit sun exposure in an effort to reduce rates of cancer. In fact, over the years, melanoma and basal and squamous cell carcinomas all have been attributed to excessive UV radiation (mostly from UVB, but UVA also has been linked to melanoma). However, more recent reports by the World Health Organization[5] (WHO) have stated that excessive UV radiation is responsible for only 0.1% of the disability-adjusted life years (DALYs) in the United States. It seems that an increased risk of skin cancer comes only after many years of over exposure, while most effects of overexposure are benign, such as wrinkles and premature aging.

On the other hand, the same report found that in the United States, the annual disease burden from insufficient sun exposure and the commensurate lack of vitamin D is a staggering 3.3 billion DALYs. Considering the size of the US population at more than 304 million, this means that vitamin D deficiency is responsible for, on average, 10 years of premature mortality and disability per person. The list of illnesses that a lack of vitamin D is linked to is enormous, including Hodgkin's lymphoma and breast, ovarian, pancreatic, and prostate cancers, among others.

As well, evidence to the opposite effect shows that higher levels of vitamin D reduce multiple sclerosis, metabolic syndrome, diabetes type 2, hypertension, and rheumatoid arthritis, just to name a few.[4] D. Joan Lappe and her colleagues published research in the *American Journal of Clinical Nutrition* in 2007, which proved that taking 2 to 4 times the daily dietary reference intake of 200 to 600 IU of vitamin D_3 reduced the incidence of all cancers over a 4-year period in postmenopausal women by 50 to 77%.[6]

Knowing this, the question becomes, "How much sun is enough sun?" The answer is, "It depends." We know that everyone needs a minimum amount of sunlight, and, depending on the color of a person's skin, the region someone lives in, the time of year, and how much time the person spends outdoors, this amount will greatly vary the time requirements for direct exposure of sunlight on the skin. During colder times of the year, with variations in climate, many in the northern United States need to supplement with vitamin D. A simple precaution for patients is to recommend they take 2000 IU of vitamin D/d, and for the remainder of their daily needs, spend a few minutes outdoors during the winter months (3-15 minutes outdoors for fair skin and 15-30 minutes for darker skin tones). To be clear, a person needs to have approximately 40% of skin exposed when the sun is highest in the sky—midday. Often during the summertime, when most people spend more time outdoors, less supplementation is needed.

The Truth About Sunscreen

What about topical sunblock or sunscreen? Evidence suggests that sunburn, which is also caused by UV radiation,

Patient Handout: Healthy Sun Practices

Healthy Sun Protocol: As a general rule, 3 to 15 minutes outdoors for white and 15 to 30 minutes outdoors for darker skin tones in a midday, unobstructed sun with 40% of skin exposed will provide most people with a protective vitamin D level (up to 50 000 IU of Vitamin D in the next 24 hours). The Reference Daily Intake (RDI) is 200 to 600 IU of vitamin D/day. Studies suggest 2000 IU/day to have a protective effect, which can be delivered by regular exposure to the sun.

Sunscreen is required if the ultraviolet (UV) index is 3 or above (see sidebar, "Explanation of Ultraviolet Index Numbers"). It is best to use a sun protection factor (SPF) no greater than 15 to gain the benefits of vitamin D–induced sun exposure without burning.

Reapply sunscreen frequently. Sweating and swimming dilute any sunscreen's effectiveness. Next to using SPF that is too low or not using any protection, the failure to reapply consistently is the main cause of burning. In intense sun, even if you are not overly physically active, reapply at least every hour.

Don't rub it in. Rapid absorption of lotion leaves the outermost layers of skin with reduced SPF. Therefore, dab sunscreen onto sun-sensitive areas first. Wait 60 seconds, then gently reapply sunscreen to these same areas and also evenly cover the rest of your exposed skin.

Keep your skin moisturized and hydrated. Moist skin is far less likely to burn and will tan faster. Moisturize and nourish your skin with creams, lotions, or oils several hours before (to give the moisturizer time to soak in and, if using oil, to reduce the sheen) and also after long sun exposure.

Cool it. If your skin overheats, it can react with a classic heat rash, which can quickly lead to burning. Frequently cool off either with or in the water and reapply sunscreen. Avoid waterproof, sport block, sweat-proof, and baby-block sunscreens if spending extended periods in the sun. The petroleum bases in these products can cause the skin to overheat quickly.

Take frequent shade breaks. Taking 15 minutes or more per hour is enough time to let your skin cool down and recover.

Never expose burned skin to more sun. Burned skin will not tan—it will only get worse. Keep burned skin cool and try to minimize sweating to reduce chances of blistering. Never put waterproof sunscreens on pink or burned skin as it will overheat.

Healthy sun protocol: Whether it is the start of a summer trip or a visit to a sunnier locale, allow your skin to slowly get accustomed to increased levels of sun. Start with a short amount of time in the sun (less then 15 minutes at a time). Once you work up to an hour, take a shade break. Gradually progress to longer sun exposure. Having an established base tan means that your skin is producing enough melanin to supplement the protection of the sunscreen you are using. As you develop a healthy tan, you can use a lower SPF, letting your skin absorb healthy amounts of vitamin D–producing UVB rays.

Tanning Beds: Studies have not concluded that tanning beds increase the risk of cancer. However, due to exposure times, tanning beds do increase the risk of burns and require caution. At times, sunscreen is a useful preventative measure.[7]

inhibits the endogenous production of vitamin D. So, in a sense, a person only needs enough sunscreen to prevent burning. This is because regular sun exposure produces natural sunblock by the production of melanin; therefore, more time in the sun helps the skin regulate more naturally, becoming less likely to burn. Thus, with regular, healthy time in the sun, the need for sunscreen is minimal and rarely will someone need to use a sunscreen with a sun protection factor (SPF) greater than 15. (Caution: Some people have very sensitive skin and need more protection.) Remember, the SPF allows a person more exposure before burn. For example, an SPF of 15 allows someone to be exposed to UVB for 15 times longer than he or she would normally be able to stay in the sun without burning. If someone has not been in the sun for many months and finds himself on a beach for the day, he could assume that he would begin to burn after about 10 minutes. Thus, 15 x 10 minutes = 2 hours. So, rather than using a higher SPF, it's healthier for a person's vitamin D stores to apply the same sunscreen more frequently.

More importantly, numerous commercial sunscreens contain chemicals that are problematic for human and environmental health. Many of the synthetic chemicals have been shown to be endocrine disruptors, mimicking natural hormones in the body. Endocrine disruptors have been linked to various forms of cancer, can inhibit human growth and reproductive health, and can persist in the body and in the environment. Equally, for the outdoor types, leaving lots of sunscreen chemicals in lakes and streams is not good for the environment. Until more research is done on the long-term effects of these chemicals, watch out for these common sunscreen ingredients for the above-stated reasons:

- benzophenone-3 (Bp-3),
- homosalate (HMS),
- 4-methyl-benzylidene camphor (4-MBC),
- octyl-methoxycinnamate (OMC),
- octyl-dimethyl-PABA (OD-PABA).

Safe Sunscreen Choices

Chemical-free and natural sunscreens use mineral blocks, such as titanium dioxide and zinc oxide, to protect the skin from UV rays. These physical, barrier-type sunscreens protect against both UVA and UVB rays. Numerous brands are nontoxic, low in skin irritants, and free of perfumes or petroleum-based polymers and thus are healthier for the skin and environment.

In this information age, your patients can easily find out about local sun conditions. If the UV index is 3 or above, they will need some sun protection. (See Patient Handout sidebar for an explanation of the numbers.) Remind them to be prepared for proper sun exposure. The EPA's Sun Wise program (see Resources sidebar) gives all the information someone needs to make a healthy choice. However, remember that time in the sun is extremely important for health. Advise your patients to regularly spend time outdoors. Their health depends on it.

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Patient Handout: Explanation of Ultraviolet Index Numbers*†

Low	<2	A person can safely enjoy being outside. If someone burns easily they should cover up and use sunscreen with a sun protection factor (SPF) of 15 or higher.
For the following numbers, precautions are recommended or needed if outside, such as wearing a hat and sunglasses and using sunscreen SPF 15 or higher. In addition, exposure to the sun's most intense ultraviolet (UV) radiation should be reduced by seeking shade during midday hours.		
Moderate	3-5	Precautions against sun damage are recommended.
High	6-7	Precautions are needed. Additionally, reduce time in the sun between 10 AM and 4 PM.
Very High	8-10	Precautions are needed: A shirt, hat, sunscreen, and shade breaks are a must. Additionally, reduce time in the sun between 10 AM and 4 PM.
Extreme	11+	Precautions are needed: A shirt, hat, sunscreen, and shade breaks are a must. Try to avoid sun exposure between 10 AM and 4 PM.

*White sand, snow, and other bright surfaces reflect UV rays and can increase UV exposure up to 2x its normal strength.

†An easy way to tell how much UV exposure you are getting is to look for your shadow:
- If your shadow is taller than you are (in the early morning and late afternoon), your UV exposure is likely to be low.
- If your shadow is shorter than you are (around midday), you are being exposed to high levels of UV radiation. Seek shade and protect your skin and eyes.

Adapted from the US Environmental Protection Agency (EPA) UV Index Scale.[8]

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