

Sun exposure and vitamin D

We know that sunny holidays and sunburn increase the risk of melanoma. We also know that the genes we inherit determine the level of that risk. So, people with dark skin, which never burns, and very few moles are much less likely to develop melanoma as a result of sunny holidays than those with freckles and lots of moles.

The idea that disease results both from inherited genes and the environment is accepted in many areas of health: smoking causes lung cancer but whether a particular smoker will develop lung cancer partly depends on their genes. In a similar way, some people around the world are more likely to become diabetic because of their genes and their environment, although their diet also plays a part.

So what is it about sunny holidays that appears to cause melanoma? Most people living in Europe and North America work inside. Many of them take relatively short but very sunny holidays. Over time it has become socially acceptable to expose most of the body to the sun and the desire for a suntan means that many do so.

This combination of factors results in a lot of sunburn. Research has shown that the sun's energy can damage the DNA (genetic material) in our skin cells via sunburn. It can also reduce the ability of the immune system to repair the damaged DNA. It is this dual challenge, which is thought to cause melanoma.

There are however undoubtedly many good things about sun exposure. It can be beneficial to our psychological health and enables our bodies to produce vitamin D. Vitamin D is of enormous importance to health and we typically consume only limited amounts of it unless we eat large quantities of particular foods such as oily fish. However, there is clear evidence that holiday sun exposure and sunburn are causing a great increase in melanoma among fair skinned and 'moley' people.

In order to control this worrying trend it is necessary to moderate this type of exposure in the vulnerable. As vitamin D is very important to human health this should however be done without resulting in vitamin D deficiency. There remain several key questions concerning vitamin D such as: "what levels we should be aiming for?" and "how do we achieve those levels?"

In studies on risk of cardiovascular disease, both low and high levels of vitamin D were reported as harmful¹ so there are concerns about what advice to give. High levels might also increase the risk of kidney stones and cause suppression of the immune system. The effects of vitamin D are most consistently reported to be favourable at a serum level of around 70nmol/L (although this remains controversial). Our laboratory in Leeds suggests levels should be in excess of 60 nmol/L, so in Leeds we would like to see levels between 60 and 90 nmol/L.

The factors that govern vitamin D levels include how much sun exposure one has had (and therefore the season of year) and skin colour (levels tend to be lower in darker skinned people living in Europe or very fair skinned people who find it difficult

to go out in the sun without burning). Other factors include how much fatty fish we eat, how much supplementation we use, what our body mass index is (levels tend to be lower in the obese) and what genes we have inherited.

Given all these factors it is difficult to be precise about what supplements we might take. So what advice should be given about balancing sun exposure with the aim of avoiding skin cancer without becoming short of vitamin D? In Leeds UK, we strongly advise that those who are vulnerable to burning and those who are 'moley' take great care to avoid sunburn. They should follow sun avoidance guidance and use sunscreen when appropriate. They should also avoid becoming short of vitamin D by taking vitamin D supplements in line with recommended daily allowances for their country (and, importantly, not to take very high doses as high levels of vitamin D in the blood might be harmful).

For those whose skin almost never burns, who are not 'moley', and who do not have a family history of skin cancer the message is less clear. Such people should avoid sunburn but not reduce their sun exposure to the extent that it makes them vitamin D deficient. Even then however it may be necessary to take vitamin D supplements in the winter. Very dark skinned peoples living in Europe, especially if they cover their skin for cultural or religious reasons, should probably take vitamin D supplements through much of the year.

In very sunny areas of the world, large doses of sun exposure spread over a long period of time are also likely to be harmful and therefore the message should be moderation in sun exposure. Also, skin ageing and squamous cell carcinoma (a form of skin cancer) are undoubtedly related to such large cumulative exposures so there are other reasons to moderate exposure as well. Vitamin D supplementation is likely to be less of an issue there.

Despite the complicated picture a clear message can be given to everyone:

- Avoid sunburn.
- Avoid excessive sun exposure.
- Do not become vitamin D deficient. If you live in Europe and need to avoid the sun, take supplements according to your national advice.
- Learn to know your skin and look after it.

1. Wang, T. J.; Pencina, M. J.; Booth, S. L.; Jacques, P. F.; Ingelsson, E.; Lanier, K.; Benjamin, E. J.; D'Agostino, R. B.; Wolf, M.; Vasan, R. S., Vitamin D deficiency and risk of cardiovascular disease. *Circulation* 2008, 117, (4), 503-11.

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