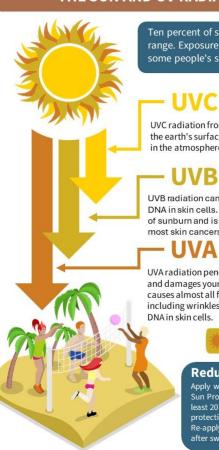
THE SUN AND UV RADIATION



Ten percent of sunlight is in the UV range. Exposure to UV light causes some people's skin to tan and burn.

UVC radiation from the sun does not reach the earth's surface because the ozone layer in the atmosphere blocks it.

Wavelength 280-315 nm

UVB radiation can directly damage the DNA in skin cells. It is the leading cause of sunburn and is also thought to cause most skin cancers.

> Wavelength 315-400 nm

UVA radiation penetrates deep into our skin and damages your skin, resulting in a tan. It causes almost all forms of skin aging, including wrinkles, and indirectly damages

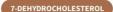


Reduce the Risk

Apply waterproof sunscreen with a Sun Protection Factor (SPF) of at least 20 that has UVA and UVB protection to all exposed areas. Re-apply every two hours and after sweating.

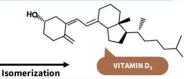
THE SUNSHINE VITAMIN

Vitamin D is the sunshine vitamin. During exposure to sunlight, UV B photons enter the skin and photolyze 7-dehydrocholesterol to pre-vitamin D3, which is then isomerized by the body's temperature to vitamin D₃.





PRE-VITAMIN D₃





Good Sources

UVB rays from the sun cause the body to produce vitamin D. Optimal exposure is 5 to 30 minutes.

Food sources of vitamin D are fatty fish, eggs, beef liver, and mushrooms.

VITAMIN D

Function

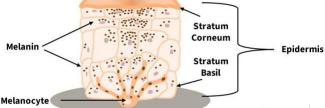
Vitamin D is essential for maintaining healthy bones and teeth. That's because your body can only absorb calcium, the primary component of bone, when vitamin D is present. Vitamin D also regulates inflammation and immune



SUN EXPOSURE AND YOUR SKIN

MELANIN PRODUCTION AND TANNING





Reduce the Risk

In addition to wearing sunscreen, remember to cover and protect your skin with broad-brimmed hats, lightweight long-sleeved shirts, and long pants. Wear UV-blocking sunglasses to protect your eyes



DNA DAMAGE AND SUNBURNS

UV radiation can directly damage DNA by causing two types of DNA lesions. The first type causes bases to react with each other, forming products like cyclobutane pyrimidine dimers (CPDs); the second type produces 6-4 photoproducts. (6-4PPs) Both types of lesions distort DNA structure, which can impede transcription and replication. The light can also damage DNA indirectly when excited melanin generates reactive oxygen species

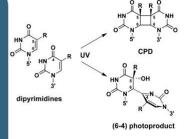


Image from reference 4



DNA-repair enzymes can fix damaged DNA by removing and correcting defective sections. But if cells become too damaged, they self-destruct, signaling immune cells with proteins, including prostaglandins and cytokines. These proteins cause increased blood flow and inflammation, leading to pain, redness, and sunburn.

REFERENCES

- 1. Clancy, S. (2008) DNA damage & repair: mechanisms for maintaining DNA integrity. Nature Education 1(1):103
- 2. EPA website: www.epa.gov/radtown
- Holick MF. Sunlight, ultraviolet radiation, vitamin D and skin cancer: how much sunlight do we need? Adv Exp Med Biol. 2014;810:1-16. PMID: 25207357.
- Li J, Uchida T, Todo T, Kitagawa T. Similarities and differences between cyclobutane pyrimidine dimer photolyase and (6-4) photolyase as revealed by resonance Raman spectroscopy: Electron transfer from the FAD cofactor to ultraviolet-damaged DNA. J Biol Chem. 2006 Sep 1;281(35):25551-9. doi: 10.1074/jbc.M604483200. Epub 2006 Jul 1. PMID: