

TANNING, UV RADIATION AND SKIN CANCER

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(1) In Westernized countries, tanning has become more and more popular since the 1920s. Before this time, having pale skin was much more valued because darker skin was associated with the poor and lower class who worked outdoors and became tanned. People with more wealth stayed indoors and remained lighter skinned so pale skin became a sign of status and therefore beauty as well. After the 1920s, having darker skin became more desirable because a tan became associated with a lifestyle that involved outdoor fitness and the wealth that could fund frequent vacations to sunny destinations. Getting the perfect tan has become a new status symbol and more and more people are tanning to obtain this look. Most people achieve tans by sun bathing and tanning beds, though some apply chemical bronzers on their skin to tan.

(2) A traditional tan forms when the skin darkens in response to increased exposure to ultraviolet radiation (UVR). UVR can come from sunlight or from the lights in tanning beds. Tanning beds are coffin-shaped containers lined with UV lights. A typical session in a tanning bed involves exposing your body to 5-20 min of UV light. More and more people are turning to tanning beds because they are convenient, affordable and people can tan naked so that they can avoid tan lines. For some, tanning can even become an addiction.

(3) Melanocytes are skin cells which produce a substance called melanin which is a brownish black pigment that gives skin its color. Melanin also acts as a natural sunscreen by absorbing ultraviolet radiation before it can damage skin. People with naturally dark skin have melanocytes that produce more melanin than the melanocytes of lighter skinned people. All skin types (except the skin of people with albinism) can become darker if exposed to UVR. UVR causes existing melanin to get darker and causes increased melanin synthesis as well. The Sun three forms of UVR: UVA, UVB and UVC. Only UVA and UVB play a significant role in darkening the skin as the ozone layer absorbs almost all of the UVC.

(4) UVA are long wavelength ultraviolet waves (320-400nm) that penetrate to the deeper layers of the skin, the dermis. UVB are shorter



wavelength ultraviolet waves (280-320nm) that only penetrate the surface layers of the skin like the epidermis. UVA is more responsible for aging the skin and causing wrinkles whereas UVB is more responsible for burning the skin, though both can age and burn with enough exposure. Of the ultraviolet radiation that makes it past the ozone layer, 95% of it is UVA and the remainder is UVB. The ozone layer is not as effective at blocking UVA as it is at blocking UVB. Though less UVB hits the Earth, it is much more intense than UVA. UVB can be blocked by clouds and windows, but UVA cannot. Most sunscreens protect well against UVB, but many don't protect against UVA unless the sunscreen is a broad spectrum sunscreen. The most effective protection for UVA is sun blocking clothing.

(5) UVA and UVB have different ways of producing a tan. UVA rapidly tans the skin by oxidizing the existing melanin in the skin. This causes the melanin to turn into a darker pigment which produces a tanned appearance. This type of tan fades within a few days. UVA is the type of light used in most tanning salons.

(6) UVB induced tans work differently. UVB stimulates melanocytes to make more melanin. UVB damages the DNA in skin cells so more melanin is produced to protect the skin from further damage. Since it takes time for the skin to make melanin, the tanning response to UVB takes longer than with UVA, but it also lasts for a longer time, darkening the skin for weeks to months instead of only days. A positive benefit of moderate UVB exposure is that it stimulates the production of vitamin D from the skin. Vitamin D is essential for healthy bones.

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(7) Besides accelerated skin aging and sunburns, excessive exposure to ultraviolet radiation puts a person at risk of damaging their immune system, developing cataracts and getting skin cancer. The most common skin cancers are basal cell skin cancers and squamous cell skin cancers but these types of skin cancers are often easily treated because they rarely spread to other parts of the body. Melanoma (cancer of the melanocytes) is the rarest type of skin cancer as well as the deadliest because it can spread to other parts of the body. If melanoma is detected during the early stages and treated before it spreads, then there's a better survival rate. Melanoma rarely develops in people with dark skin.

(8) The most common cause for melanoma is excessive exposure to UVR. People who start to use tanning beds early in life (before the age of 35) greatly increase their risk of developing skin cancer. People who have pale skin and a poor tanning response (they burn easily) are also at more risk of developing skin cancer. Having multiple sunburns in childhood increases the risk of developing skin cancer later in life. Melanoma occurs more in men than in woman. For men it is usually found on the back and for women it is usually found on the back of the legs. Other risk factors include genetics. The MC1R gene is found in every person with red hair and this puts them at a 2-4 times greater risk of developing skin cancer.

Article Questions

- 1) What has caused Western populations to desire tans?
- 2) What function does melanin serve?
- 3) Besides how they produce a tan, describe 3 differences between UVA and UVB radiation.
- 4) How does UVA produce a tan?
- 5) How does UVB produce a tan?
- 6) Describe one benefit of UVB exposure.
- 7) What is melanoma?
- 8) List all the factors that would put you at a higher risk of developing skin cancer.