



Sunless chemical tanning and its possible uses

Perer J., Jandova J., Fimbres J., Jennings E.Q., Galligan J.J., Hua A., Wondrak G., "The sunless tanning agent dihydroxyacetone induces stress response gene expression and signaling in cultures human keratinocytes and reconstructed epidermis." *Redox Biology*, 05 May 2020. Summary by Devin Ritter.

Sunless tanning agents are becoming more popular among people who want to tan without risking unhealthy sun exposure and UV rays. Most tanning creams and lotions contain dihydroxyacetone (DHA), which is a color additive. When applied, DHA causes the surface of the skin to darken temporarily, therefore giving the impression of a tan. In large amounts, DHA is known to damage a person's DNA. This study was performed to examine how sunless tanning agents such as DHA affect the natural cycle and ability to survive of human skin cells.

Sunless chemical tanning is often advertised as "safer" than tanning from the sun's UV rays. This is because chemical tanning agents are supposed to stay in the outermost layer of the skin. However, there are concerns that DHA does penetrate the top layer of skin. This can be harmful to the body if it occurs in large amounts.

In this study, researchers used human skin cells to test the impacts of DHA. They found that there is a safe range of DHA exposure that does not impact the health of a cell. Results of this study showed that low, "safe" levels of DHA exposure caused human skin cells to produce a stress response to the chemical. DHA exposure is still thought to be healthier than exposure to UV rays from the sun. While 33 genes are affected by UV exposure, only 13 are affected by DHA exposure.

This study can have huge impacts in the future as more research is done regarding the impacts on human cells. Because this is a safer alternative to UV rays, there may be fewer occurrences of melanoma skin cancer, which is often caused by UV exposure. There is also the possibility of using chemical tanning to alter the appearance of irregularly pigmented skin (like in the case of vitiligo).

This study was conducted at the University of Arizona by Dr. Georg Wondrak, a professor of Pharmacology and Toxicology at the University of Arizona and a member of the University of Arizona Cancer Center. In his lab, Dr. Wondrak studies skin cancers and results of sun damage to the skin. In 2020, he was awarded the University of Arizona College of Pharmacy Dr. James R. Halpert Faculty Research Award.

What makes you tan in the sun?

The sun emits two basic types of ultraviolet (UV) rays that can change the appearance of your skin. The first, UVA, makes your skin tan by causing your melanocytes (pigmented skin cells) to produce more pigment. The second, UVB, makes you get a sunburn. It is very important to wear sunscreen to reduce the risk of sunburn and skin cancer.

Links: <https://doi.org/10.1016/j.redox.2020.101594>



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