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The Truth about Thymine Dimers and Their Role in the Development of Non-Melanoma Skin Cancers

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Editorial

Ultraviolet (UV) light falls in the range of the electromagnetic spectrum that is between visible light and X-rays (100 nm to 400 nm). This category of light can be split into three groups: UVA, UVB, and UVC. UVA (320 nm to 400 nm) and UVB (290 nm to 320 nm) are the two categories of UV light that happen to reach earth's surface and are reported to induce skin cancer, DNA damage, photoaging, and sunburn [1]. The mechanism behind DNA damage in sunlight can be further understood through the formation of thymine dimers. Thymine dimers are induced in human skin by UV radiation in sunlight and are a primary cause of skin cancer [2]. Thymine dimers form when two adjacent thymine residues are covalently bonded on a single strand of DNA, causing a 'kink'. However, the issue that lies with studies being marketed is the fact that this genetic modification is a reference to an extreme data point that results from possible impacts from UV radiation. Therefore, we cannot superimpose this reasoning onto any range of light as we please. Also, the wavelengths of light that are effective in melanoma induction are unknown; therefore, we most likely do not know whether or not blue light actively participates in the formation of thymine dimers [3]. Blue light is a portion of the visible light spectrum that the human eye can see. Blue light has wavelengths ranging approximately from 380 nm to 500 nm. Because the wavelength is greater than that of the range of UV light, we can expect that UV light is more damaging to the skin. However, some hypothesize that blue light is harmful, causing similar issues to UV light such as photoaging and cancer, but there are no long-term studies to back up these assertions. Investigating this topic may provide us more insight as to whether or not we really need protection from blue light, and if so, how to do so. Proposed studies include examining the long-term effects of the increased usage of electronic devices during the COVID-19 pandemic [4]. Although there are no long-term blue light studies investigating the use of technology, there have been short-term studies exhibiting that blue light waves from digital devices cause retinal phototoxicity [5].

A study design that may clarify gray areas around this topic may be structured by conducting a qualitative analysis of the impact of blue light. We would be measuring the amount of blue light exposure in Millennials as it relates to observable skin changes--reflective of what is considered "aging" of skin. Participants for this study can be split into two groups.

Group 1 will include newer-generation individuals that created a Facebook account after open access was granted, where school emails were not required in order to sign up for the website. This provides us a reference population because it identifies technologically skilled individuals in the new generation, similar to how Millennials were. Group 2 will include Millennials who have had a photo from graduation day of high school between the years 2003-2006. These participants will also have a current, active Instagram account for personal use.

We hypothesize that group 2 will report a significant appearance of age-related changes since their graduation photos compared to group 1 participants with their Facebook photos that were used at the time of account creation. Participant size should have 50 people per group, on a first-come basis. Potential limitations/biases for this study may be that we imply that the people we are studying are overall active members of the social media communities we are surveying. Seeing that the development of thymine dimers occurs on a relatively rare basis, we do not know much in regards to the wavelengths that bring about its formation. For further research on the topic one needs to consider first what wavelengths are directly linked to causing thymine/nucleotide dimer formations. In this way, we can begin to build possible relationships between the damage caused by ultraviolet radiation and potential blue-light damage. Doing so will open doors to further investigation within skincare and whether or not marketed skincare products have plausible research behind their protective effects.

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References

1. Ley RD. Dose response for ultraviolet radiation A-induced focal melanocytic hyperplasia and nonmelanoma skin tumors in Monodelphis domestica. Photochem Photobiol. 2001;73(1):20-3.
2. Reardon JT, Sancar A. Recognition and repair of the cyclobutane thymine dimer, a major cause of skin cancers, by the human excision nuclease. Genes Dev. 2003;17(20):2539-51.
3. Setlow RB, Grist E, Thompson K, Woodhead AD. Wavelengths effective in induction of malignant melanoma. Proc Natl Acad Sci U S A. 1993;90(14):6666-70.
4. Jakhar D, Kaul S, Kaur I. Increased usage of Smartphone's during COVID-19: Is that blue light causing skin damage? J Cosmet Dermatol. 2020;19(10):2466-7.
5. Panda P, Mohanty S, Pal A, Mukkamala S. Blue light protective cosmetics: Demand of the digital era. Res J Pharm Life Sci. 2021;2(2):43-58.