

## Toxicity of Environmental UV Radiation: The Malicious Fraction of Terrestrial Solar Spectrum

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### Abstract

The terrestrial spectrum of solar radiation consists of 1-5% of UVB (280-320nm) and 95-99% of UVA (320-400nm) radiation. Both types of UV radiation have been classified as complete carcinogen because of its ability to promote and progress tumours. It is also the most common cause for skin cancer and other skin disorders cause due to environmental factors.

**Keywords:** UV Radiation; Toxicity; Skin

Ultraviolet radiation has been termed as a “carcinogen” by the World Health Organisation and our exposure to it causes various inevitable disorders including accelerated skin ageing, photodermatoses, and depression of the immune system of the skin [1]. Both UV-A and UV-B rays can cause unimaginable damage to the skin which includes premature skin aging, DNA damage, and some skin cancers [2].

UV-B radiation is absorbed by the stratum corneum and the upper layers of the epidermis whereas UV-A can penetrate deep into the dermis [3]. Long-term exposure of UV radiation increases the risk of basal cell carcinoma, squamous cell carcinoma, and malignant melanoma [4]. Phototoxic and photoallergic reactions; autoimmune diseases like lupus erythematosus, idiopathic photodermatitis and varieties of skin cancers; melanoma, non-melanoma cutaneous neoplasia, and preneoplastic disorders are other adverse effects of ultraviolet radiation exposure [5]. UV radiation causes sunburn, damages DNA at the cellular level through direct excitation process on the nucleotide bases; mostly thymine, cytosine and the minor 5-methylcytosine and causes the formation of dimeric photoproducts at bipyrimidine sites. At the molecular level UV radiation, degrades collagen and elastin fibers via synthesis of endogenous matrix metalloproteinases; and initiates a cascade of ROS and inflammatory cytokines via activation of the AP-1 and NF-kB pathways [6,7].

Regulated as OTC drugs by the United States Food and Drug Administration (US FDA) sunscreens are the most popular and approved method of sunprotection. Currently there are 17 active sunscreen ingredients which are approved by the US FDA and 12 ingredients which are awaiting approval via Time and Extent Application (TEA) [8]. Apart from all these, avoiding the sun between 10 AM to 2 PM; wearing protective clothing, seeking shade, wearing sunprotective headgears and eyewear are other modes of protection from UV radiation proposed by the US FDA [9].

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