Cause of immunotoxicity by ultraviolet radiation and its effects on health.

Joana Levine*

Department of Toxicology, University of Pisa, Pisa, Italy

Chronic UV radiation exposure also causes a number of degenerative changes in the skin's cells, fibrous tissue, and blood vessels. Freckles, nevi, and lentigines are pigmented areas of the skin, as is diffuse brown pigmentation. UV rays hasten skin ageing, and the gradual loss of elasticity results in wrinkles and dry, coarse skin. Non-melanoma skin cancers include basal cell carcinomas and squamous cell carcinomas. Although these are rarely fatal, surgical treatment is often painful and disfiguring. Because reliable registration of these cancers has not been achieved, it is difficult to determine the temporal trends in their incidence.

The most well-known acute effect of excessive UV exposure is erythema, also known as sunburn. Furthermore, most people will tan as a result of UV stimulation of melanin production, which occurs within a few days of exposure [1]. Another, less obvious adaptive effect is the thickening of the skin's outermost layers, which reduces UV penetration into the deeper layers of the skin. Both of these changes indicate skin damage. Skin damage susceptibility varies according to skin type; individuals with fairer skin are more prone to sunburn or erythema than those with darker skin. Similarly, skin type influences the ability to adapt to UV exposure. Corticosteroids, radiation, heavy metals, halogenated aromatic hydrocarbons, drugs, air pollutants, and immunosuppressive drugs are examples of common immunosuppressive agents [2]. These chemicals can cause mutations in immune system regulatory genes, altering the amount of critical cytokines produced and causing insufficient immune responses when antigens are encountered. These agents have also been shown to kill or damage immune cells and bone marrow cells, making it difficult to recognise antigens and generate novel immune responses.

Asthma and other hypersensitive or allergic reactions are frequently associated with immunotoxic agents, and the number of people experiencing these symptoms is increasing in developed countries. This is due in part to an increase in the number of immunotoxic agents. Nanomaterials, which are commonly absorbed through the skin or inhaled, have been linked to hypersensitive reactions by recruiting immune cells [3]. Immunotoxic agents can increase the frequency with which the immune system attacks self molecules. Although genetic factors are the most common cause of autoimmunity, immunotoxic agents such as asbestos, sulfadiazine, silica, paraffin, and silicone can also increase the likelihood of an autoimmune attack. These agents are known for disrupting the delicately balanced immune system and promoting the development of autoimmunity [4]. Changes in circulating regulatory and responder T cells are good indicators of an immunotoxic agent-induced autoimmune response.

These immunotoxic substances have been shown to influence both the innate and adaptive immune systems. The effects of xenobiotics affect the organ with which they come into contact. Immunosuppression, hypersensitivity, and autoimmunity are all common side effects of contact with immunotoxic substances [5]. Toxin-induced immune dysfunction may also increase cancer susceptibility. Immunotoxic substances can harm the immune system by destroying immune cells and altering signalling pathways. This has far-reaching implications for both the innate and adaptive immune systems. Changes in the adaptive immune system can be observed by measuring cytokine production, surface marker modification, activation, and cell differentiation. Changes in macrophage and monocyte activity also indicate changes in the innate immune system.

The eye is recessed within its orbit, protected by the brow ridge, brows, and eyelashes. To reduce the penetration of the sun rays into the eye, bright light causes pupil constriction and the squinting reflex. However, under extreme conditions such as sunbed use or strong ground reflection from sand, water, and snow, the effectiveness of these natural defences in protecting against the dangers of UV radiation is limited. Photokeratitis and photoconjunctivitis are two acute effects of UV radiation exposure. These inflammatory reactions, which are similar to sunburn of the extremely sensitive skin-like tissues of the eyeball and eyelids, typically appear within a few hours of exposure. Both can be extremely painful, but they are reversible and do not cause long-term damage to the eye or vision.

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***Correspondence to:** Joana Levine, Department of Toxicology, University of Pisa, Pisa, Italy, E-mail: joanalevine531@up.it

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