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What is the Role of Vegetables and Protective Clothing in Photoprotection?

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Abstract: Exposure to Ultraviolet (UV) radiation present in sunlight, photo-oxidative reactions are initiated which affect the integrity of skin cells and damage biomolecules and skin. Every time the skin is exposed to UV light, some damage occurs and the cumulative effect of that repeated damage is epidermal DNA damage, oxidative stress, persistent inflammation, and suppression of T-cell mediated immunity.

Key words: UV radiation, photoprotection, carotinoids, antioxidant therapy, protective clothing, soldiers

INTRODUCTION

The responses of human skin to solar UV radiation are recognized in the form of inflammatory reaction that are mediated by these pathways:

- Generation of the Reactive Oxygen Species (ROS) and free radicals.
- Generation of inflammatory mediators.
- Direct action of absorbed photons on DNA of viable nuclei of skin cells.

There are two strategies for avoiding excessive sun exposure, heat stress:

- Using protective clothing and/or sunscreens (Afaq *et al.*, 2002; Fguyer *et al.*, 2003; Mukhtar, 2003).

The evidence that consumption of antioxidants, lutein and zeaxanthin found in green leafy vegetables by SKH-1 mice diminished the effects of UVB radiation by reducing UV-induced hyperproliferative rebound and reducing acute inflammatory responses was provided by (Gonzalez *et al.*, 2003).

In this study the effect of dietary carotenoids is also described on UVB exposure-mediated increase in Terminal Deoxyribonucleotidyl Transferase (TDT)-mediated dUTP- digoxigenin nick end labeling (TUNEL) positive cells. This implies that vegetables, carotenoids inhibit the process of apoptosis (Mukhtar, 2003).

The staff chief of Hungarian 2nd Royal Army on the 9th January 1943 in Russia wrote the next meaning: "Especially critical is the army's situation of underwear, the people-nation bulk carry ragged, incorrigible underwear used up totally. The ally teams, but the German teams' clothing is in a right state especially. Wool and the deficiency of cotton were made of plastics on this case I ask the delivery of clothing and underwear. The clothing was unobjectionable yet in 1942. April at the time of the Army starting for the front. The heavy baize dresses later, was not able to be exchanged for easy summer linen dress in summer" (Nagy-Pisztrai-Tóth-Zimonyi, 1984; Révai, 2007).

The Personal Protective Clothing (PPC) protect the skin from mechanical and biological injury. The high level of protection required by PPC severely impedes heat exchange by sweat evaporation. During the decades the interest in clothing research has grown. The development of advanced thermal manikins and measurement procedures should provide better measures for predictive models (Holmér, 2006).

Conclusion: Vegetables, carotenoids inhibit the process of apoptosis and UVB exposure results in the formation of sunburn cells, which are considered to be preapoptotic cells. Carotenoids possibly inhibited the formations of these preapoptotic cells by preventing DNA damage.

It is important to emphasize that the approach of using vegetables, carotenoids antioxidants cannot be the sole strategy to reduce UV-induced adverse effects in soldiers, but could be an add-on to the existing strategies of avoiding excessive exposure to sun and heat stress using personal protective clothing.

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