Lycopene Benefits & Skin Health

There are two major types of ultra-violet (UV) radiation that reach us from the sun:

- UV-A penetrates deep into the skin. It does not cause sunburn but does age the skin;
- UV-B causes reddening and pain and is responsible for the majority of sunburns;

It is widely accepted that both UV-A and UV-B can damage DNA in the skin which can lead to skin cancer.

"Over the last thirty years, the incidence of malignant melanoma has increased more than for any other common cancer in the UK. Some of the increase may be due to increased surveillance and early detection as well as changes in diagnostic criteria but most is considered to be real and linked to changes in sun behaviour."

(Cancer Research UK).

The large family of coloured compounds call "carotenoids" (of which lycopene is one) are known to help protect plants from too much sunlight and this has prompted scientists over many years to investigate if these pigments might also be able to help protect humans from the dangers of ultra-violet radiation.

Skin Research, Trials & Mechanisms

One of the earliest and most important trials developed by the Fitzpatrick group at Harvard Medical School used large doses of beta-carotene in a therapeutic trial addressing one of a group of hereditary human diseases called porphyria. This hereditary disease leads to the accumulation of precursors of blood in the skin and these precursors absorb light and generate a damaging form of oxygen called ‘singlet oxygen’ (this is what also destroys plants in too much light). The singlet oxygen leads to rapid skin damage, first shown by a German doctor about 100 years ago.

Dr. Mathews-Roth, a member of the research group led by Professor Fitzpatrick, treated patients with a high concentration of beta-carotene (up to 180mg/day) for many weeks and observed a significant reduction of the disease. This effective medical procedure was so successful it is still used to treat porphyria today (those who saw the film "The Madness of King George" will have seen the effects of this disease, King George III suffered from it!)

Similar results have been reported by other research workers. For example, a trial by Gollnick and colleagues concerned 20 healthy young
females exposed to 13 days of sunlight in Eilath, Israel to evaluate the efficiency of 10 weeks of 30mg/day beta-carotene dosage. The results showed that beta-carotene plus usual sunscreens prevent acute UV-induced skin damage more effectively than just normal sunscreens by themselves and, the authors claim, probably prevent long-term skin aging. However, whilst such results appear to add weight to the value of carotenoids in skin protection, it is not easy to speculate on molecular mechanisms.

There have been several subsequent trials showing beneficial effects for carotenoids, especially lycopene, in combination with other anti-oxidants such as vitamins C and E. The recent results of Rhodes and co-workers reported a study of 20 healthy females who ingested 55g of tomato paste (equivalent to 16mg lycopene) daily for 12 weeks. Ultraviolet radiation-induced redness and skin sensitivity were assessed and skin biopsies were taken from unexposed and UV-exposed skin pre- and post-supplementation so that standard biochemical tests could also be employed. Overall, the dietary supplementation with the tomato paste led to a reduction in UV-induced redness and skin damage (including DNA damage). The conclusion of this trial was that tomato lycopene potentially provides protection against photodamage of the skin’s connective tissues. Several skin anti-ageing products are now available based on this effect.

Overall there is strong evidence for carotenoid protection against sunlight-induced skin damage both in the short and long term. However, the efficacy depends on several factors, length of treatment being particularly important.

As well as reducing erythema (redness) and possibly long-term skin aging, lycopene has also been shown to improve ‘skin health’ such as a reduction in skin roughness. The studies by Dr Darwin and colleagues suggest anti-oxidants other than carotenoids, such as vitamin C and E, also contribute to this beneficial effect.

References

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