



SMALL MOLECULE TECHNOLOGIES, INC.

MOLECULES & HEALTH

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Decreasing Sun Sensitivity Inflammation



Exposure to the sun can cause UV-induced damage to DNA in skin cells resulting in inflammation known as sunburn. Skin contains molecules that absorb UV radiation such as DNA and other chromophores. The absorbed energy is then re-emitted as harmless, longer wavelength radiation or cell-damaging thermochemical reactions involving free-radical reactive oxygen species (ROS) generation and oxidative stress.

Small Molecule Technologies skincare products, including Renewal Moisturizer, contain ingredients that counteract oxidative stress such as oleuropein, resveratrol, EGCG, melatonin, and L-glutathione. Oxidative stress typically results in inflammation; various ingredients found in Small Molecule Technologies skincare products decrease inflammation including the bene-

ficial polyphenols oleuropein, resveratrol, and epigallocatechin-3-gallate (EGCG) from olives, grapes, and green tea, respectively, as well as the important small molecules, melatonin, and L-glutathione.

In addition, dipotassium glycyrrhizinate, aloe vera and shea butter also possess anti-inflammatory activities.

Moreover, Small Molecule Technologies skincare products contain ingredients that are photoprotective including EGCG, resveratrol and oleuropein. EGCG has been shown to counteract the detrimental effects of UV radiation on immunity. Resveratrol has been shown to protect human skin from damage induced by repeated exposure to UV radiation. In addition, photoprotection has been found with increased levels of the enzyme, heme oxygenase that is induced by oleuropein. Furthermore, two other beneficial ingredients found in Small Molecule Technologies skincare products, melatonin and niacinamide (nicotinamide), exert strong protective effects

against UV-induced skin damage, respectively.

Besides the common sunburn, there are many other photo-induced inflammatory skin reactions that can be caused by ingestion or contact with chemicals in medicines or plants. These photosensitizers can cause either phototoxic reactions or photoallergic reactions. Phototoxic reactions range from exaggerated sunburn-like reactions to more serious lesion-forming reactions. Photoallergic inflammatory reactions are a delayed type of hyper-



sensitivity characterized by itchy, eczema-like skin reactions.

Phototoxicity

Some of the phototoxic chemicals that induce photosensitivity include antibiotics such as tetracyclines and sulfonamides, antifungals such as voriconazole, diuretics such as furosemide and non-steroidal anti-inflammatory drugs such as naproxen. Other phototoxic chemicals can

be found in certain plants including St. John's wort and plants of the Apiaceae (Umbelliferae) family. This family includes weeds and edible plants such as hogweed (cow parsnip), cowbane, carrots, coriander, parsley, parsnip, dill, fennel, celery, anise and poison hemlocks. All of these plants contain psoralens (furocoumarins) that normally bind DNA loosely, but become covalently bound to DNA upon UV exposure, leading to skin cell damage. Following exposure to both psoralens and UV radiation, lesions may appear on the skin within 8 to 24 hours. Vesicles and large blisters can appear along with irregular red patches and streaks accompanied by a burning sensation, but no itching (pruritus). As the lesions heal, the skin often becomes pigmented but slowly fades over weeks to months.



Skin Inflammation

With photoallergic dermatitis (skin inflammation), the chemical molecule contacting the skin absorbs radiation forming a new molecule. This new molecule binds to proteins in the skin

creating an antigen that can elicit an allergic reaction. Some common photoallergic chemicals include benzophenones like oxybenzone in sunscreens, fragrances such as sandalwood oil, antibacterials including hexachlorophene, antifungals such as buclosamide and anti-malarials including quinine. It's important to realize that other photodermatoses (or skin reactions to UV) radiation may not involve inflammation including polymorphous light eruption (PLE), which is prevalent in approximately 20% of women from temperate climates. PLE involves an immune (T cell) response to an unknown normal skin protein modified by UV exposure. In addition, photoaggravated skin reactions can result from autoimmune diseases (including lupus), infectious conditions, nutritional deficiencies, and defective DNA repair disorders (including xeroderma pigmentosum).

However, some photoaggravated skin conditions including psoriasis do involve inflammation. In addition, individuals with chronic actinic dermatitis have persistent eczema throughout the year that is exacerbated during the summer months. Small Molecule Technologies Hydrocortisone 1% relieves inflammation associated with minor skin irritations and rash. In addition, hydrocortisone is frequently prescribed to treat dermatitis, eczema and psoriasis.

Photosensitivity

Photodermatoses typically manifest in exposed areas of the skin including the forehead, cheeks, nape of the neck, back of the



hands and forearms. They can present with diverse features depending on the situation. The best thing for any photodermatosis is to stay out of the sun as much as possible. If you can't avoid the sun, wearing photo-protective clothing and wide-brimmed hats is important. For chemical-induced photosensitivity, attempting to identify the medicine or plant responsible for causing the photosensitivity is also important. Some skin reactions due to photosensitivity can be quite painful, especially those caused by the sap of certain noxious weeds including giant hogweed that may also cause blindness if the sap has contact with the eyes. If contact occurs, wash the sap off of skin or eyes immediately and avoid any exposure to the sun. Stay out of the sun for at least 24 hours.

Be careful when hiking to stay on trails away from harmful weeds, and wear protective clothing including gloves during yardwork. Small Molecule Technologies Hydrocortisone 1% can help if painful or itchy lesions develop on the skin that are red and swollen. Hydrocortisone is frequently used to treat hives, pruritus (itch-

ing), erythema (redness), edema (swelling), pain, inflammation and burning sensations. It's good to know that Small Molecule Technologies skincare products including Renewal Moisturizer and Hydrocortisone 1% contain ingredients that can reduce inflammation and counteract oxidative stress that is frequently involved with skin reactions to sun exposure.

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