



SMALL MOLECULE TECHNOLOGIES, INC.

MOLECULES & HEALTH

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Enhancing Diabetic Skin Health

Diabetes mellitus is a metabolic disorder associated with chronic inflammation that can lead to various health complications including skin problems. The most common form, type 2 diabetes, involves insulin resistance and decreased insulin production. Increased blood glucose or hyperglycemia is also common in diabetics. In addition, at least 30% of individuals with diabetes have some form of skin problem. Skin dryness, itching (pruritus), skin infection, and impaired wound healing are some of the common problems that can be associated with diabetes.

Dry skin is due to the fact that individuals with diabetes tend to have reduced skin hydration resulting from decreased skin lipids and a decreased ability to sweat. Elasticity may also be decreased partially due to reduced collagen in diabetic skin. An important ingredient from licorice found in Small Molecule Technologies skin and wound care products, dipotassium glycyrrhizinate, protects the vital skin glycan, hyaluronic acid that helps maintain skin hydration. In addition, dimethicone in Small Molecule Technologies Skin Renewal Cream, Small Molecule Technologies Skin Shield, and Small Molecule Technologies Skin Cleansing Lotion, protects skin and helps keep skin hydrated. Small Molecule Technologies Skin Shield and Skin Cleansing Lotion are found in the Small Molecule Technologies Diabetic Foot Care Kit (along with a Diabetic Foot Care Guide Booklet) designed especially to help diabetics take care of their skin and feet.

Hyperglycemia that frequently occurs

with diabetes is reported to induce oxidative stress through multiple pathways. Oxidative stress results from the inability of cells to eliminate free radicals known as reactive oxygen species (ROS) using the natural defense system that includes defense enzymes such as superoxide dismutase (SOD). Vascular cells and endothelium are major sources of ROS during hyperglycemia even with mild glucose elevations. Manganese SOD expression in endothelial cells has been shown to protect against oxidative stress and accelerate wound healing.

Decreasing Oxidative Stress

Hyperglycemia as well as aging can lead to advanced glycation end products (AGEs), which are highly stable cross-linked complexes of protein and glucose. AGEs have been shown to induce collagen crosslinking leading to decreased elasticity in skin and blood vessels. Interactions between AGEs and their receptors are thought to produce oxidative stress. Many of the beneficial ingredients found in Small Molecule Technologies skin and wound care products counteract oxidative stress including the important polyphenols oleuropein, resveratrol, and epigallocatechin-3-gallate (EGCG) from olives, grapes and green tea respectively, as well as melatonin, and L-glutathione.

Decreasing Inflammation

Chronic inflammation and immune



dysregulation that are typical in diabetes, increase the risk of persistent cell injury and infection, and result in decreased skin repair and skin defense functions. Chronic inflammation in diabetic individuals also contributes to neuropathy and microvascular complications. Poor circulation decreases oxygen and other vital nutrient flow to skin tissues making diabetics more susceptible to skin damage, as well as contributing to impaired wound healing.

Small Molecule Technologies skin and wound care products contain small molecule nutrients including antioxidants, amino acids and vitamins that can penetrate skin and provide vital nutrition to cells to help strengthen skin and increase cellular repair. Various ingredients found in the Small Molecule Technologies skin and wound care products also possess anti-inflammatory activities including oleuropein, resveratrol, EGCG, melatonin, L-glutathione, and dipotassium glycyrrhizinate.

Along with providing nutrition to skin, it's important for diabetics to



check the condition of their skin regularly, especially skin on their lower extremities and feet.

Diabetic Foot Care Kit

The Diabetic Foot Care Kit includes an important Diabetic Foot Care Guide Booklet to help diabetics take care of their skin and feet. Helpful advice from healthcare professionals is contained in the Guide Booklet including the fact that individuals with diabetes should check their shoes regularly for foreign objects that could damage skin. Any skin damage should be monitored carefully and reported to members of their healthcare team. In addition, individuals with diabetes should be aware of the signs of infection including redness, warmth, and swelling, which should also be reported immediately to their healthcare team.

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Diabetics often have endothelial dysfunction and decreased vasodilation that contributes to poor skin responses to heat such as heating pads, hot tubs and hot baths. Heating pads, hot tubs and hot baths are dangerous for diabetics and should be avoided due the lack of sensation caused by neuropathy. Furthermore, hot water tends to increase skin dryness that can lead to skin damage. In addition, socks should be worn to help protect feet from injury. Diabetics, however, should avoid materials with high amounts of cotton, which can wick moisture away from skin.

Enhanced Wound Healing

Decreased insulin production contributes to impaired wound healing in diabetics. Insulin was shown to be a critical growth factor for skin cells (keratinocytes), and was

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found to be important for keratinocyte proliferation, migration, and differentiation. Endothelial dysregulation that occurs with diabetes also contributes to impaired wound healing. Resveratrol and EGCG have been shown to inhibit endothelial dysfunction and enhance wound healing. In addition, reduced collagen makes diabetic skin more susceptible to injury and impairs wound healing. Titrated extract of *Centella asiatica* (TECA) found in Small Molecule Technologies skin and wound care products stimulates collagen synthesis and enhances wound healing. Many other beneficial ingredients have also been shown to improve wound healing including oleuropein, resveratrol, EGCG, L-carnosine, and L-glutathione.

It's good to know that the Diabetic Foot Care Kit can help diabetics take care of their skin and feet to help them avoid foot ulcers. Small Molecule Technologies skin and wound care products enhance diabetic skin hydration, as well as help decrease inflammation and oxidative stress associated with diabetes. In addition, many of the ingredients in the Small Molecule Technologies skin and wound care products promote cellular repair to help prevent and heal wounds.

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