

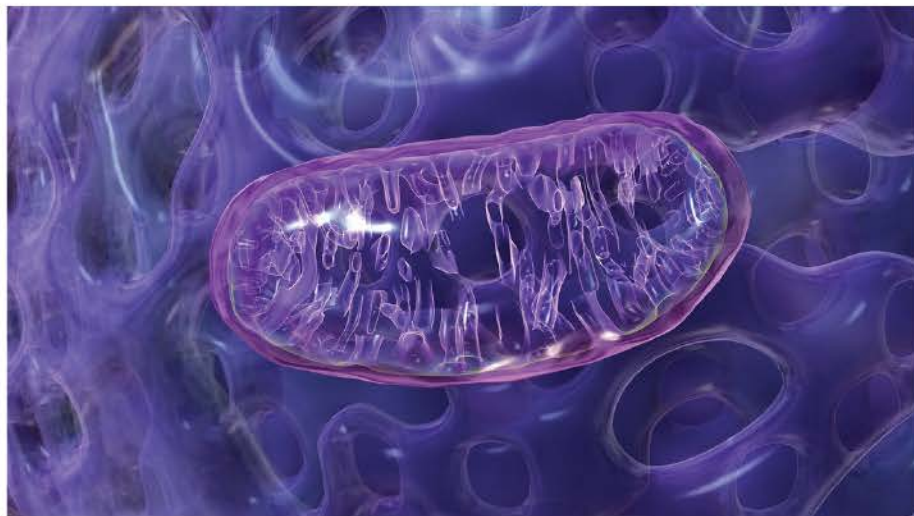


SMALL MOLECULE TECHNOLOGIES, INC.

MOLECULES & HEALTH

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Protecting Mitochondria for Skin Health



Mitochondria are organelles found in the body's cells (including skin cells) that generate energy in the form of ATP. They are known as the powerhouses of cells due to this important function. Interestingly, they are thought to originate from bacteria-related cells because of their striking similarity to bacteria (including mitochondrial DNA that is very similar to bacterial DNA) and the belief that they appear to have developed a symbiotic relationship with higher order cells, such as mammalian cells.

In addition to generating energy, mitochondria play critical roles in other cellular processes including:

1. The production of reactive oxygen species (ROS)
2. The regulation of cellular metabolism

3. Calcium signaling
4. Programmed cell death (apoptosis)
5. Inflammation
6. Wound healing

Damaged or dysfunctional mitochondria have been associated with aging and various diseases including diabetes, cardiovascular disease, Parkinson's and Alzheimer's disease. Aged, damaged or dysfunctional mitochondria produce greater amounts of ROS that may lead to oxidative stress. Skin cells are particularly vulnerable to oxidative stress due to exposure to many irritants including, UV radiation, pollution, or harmful chemicals.

In contrast, when mitochondria are healthy and ROS levels are

normal, ROS are important for regulating cellular signaling and normal processes such as wound healing. In addition, emerging evidence suggests that mitochondria are important regulators of skin physiology. Mitochondria metabolism regulates keratinocyte differentiation and mitochondria are also involved in melanocyte function. For these reasons as well as many others, protecting mitochondria in skin is essential.

Oleuropein, a potent antioxidant from olives and olive leaves found in Small Molecule Technologies skin care products, protects mitochondria by decreasing oxidative stress.

Epigallocatechin-3-gallate (EGCG), a powerful antioxidant from green tea also found in Small Molecule Technologies skin care products, has been shown to suppress radiation-induced damage to human epidermal keratinocyte mitochondria by turning on the important antioxidant enzymes superoxide dismutase2 (SOD2) and heme oxygenase-1 (HO-1).

Resveratrol, an important antioxidant from grapes or grapevines also found in Small Molecule Technologies skin care products, has been shown to suppress macrophage mitochondrial damage.

Polyphenol antioxidants such as

EGCG and resveratrol activate the critical protein factor, FOXO3a that turns on important antioxidant enzymes including MnSOD.

Melatonin

Another important antioxidant found in Small Molecule Technologies skin care products, melatonin, prevents mitochondrial dysfunction from oxidative damage by preserving an important lipid found in mitochondria called

cardiolipin. Cardiolipin abnormalities have been associated with mitochondrial dysfunction of pathological conditions as well as aging.

It's good to know that the beneficial antioxidant ingredients found in Small Molecule Technologies skin care products protect the powerhouses



of skin cells that are critical for skin health and wound healing.

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