

# DERMASCOPE

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# Foundations | *Active* *Ingredients*

## The Power of Caffeine

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**S**kin cancer is a devastating and avoidable disease. As the scientific and medical communities continue to uncover more details about its causes and how to best prevent it from developing, we must take action to educate our patients about best practices for keeping skin healthy and beautiful for a lifetime. Traditional sunscreen products are a start, but a topical ingredient that is relatively new to the skin health industry, caffeine, is demonstrating exciting and highly beneficial abilities. Adding topical caffeine into any sun protection regimen is demonstrating compelling new anti-cancer benefits.

### The Offenders

UV exposure is responsible for not only the acceleration of the visible signs of aging, but also for the development of all three types of skin cancer: basal cell carcinoma, squamous cell carcinoma and melanoma – the deadliest. It is also well-documented that UV exposure causes a suppression of the immune system and cutaneous damage due to free radicals. The sun's rays instigate the production of a variety of reactive oxygen species (ROS), such as hydroxyl radicals, nitric oxide, superoxide anions and singlet oxygen. All of these radicals induce damage to cellular proteins, lipids and DNA. Once a cell's DNA is damaged, its reproduction will produce offspring that are no longer healthy skin cells. The compromised cells produced during this cascade are what can lead to the development of tumors and cancer.

### Traditional Care

Daily use of a broad-spectrum UV protectant is the standard of care. By either reflecting or absorbing the incoming UV radiation, these products help to minimize possible damage to skin cells. No sunscreen on the market today, regardless of a ridiculously high sun protection factor (SPF) number, can block out all of the sun's rays. Fortunately, there are other measures one can take to minimize risk.

Because UV radiation reduces the body's internal antioxidant defense system's ability to protect cells, topically applied antioxidants can help to bolster the skin's own defenses, while also working to limit the damage UV-induced free radicals can inflict on skin. Some well-studied polyphenol antioxidants to add to your patient's sun protection regimens are green tea (specifically epigallocatechin gallate – EGCG), silybin, ergothioneine, resveratrol, cocoa extract and coffee arabica extract. But even these power-

house antioxidants can only provide so much protection – that is where caffeine can make its mark.

### Multifunctional Caffeine

Topically applied caffeine has the proven ability to reduce the production of sunburn cells with its UVB absorbing capability. Additionally, both topically applied and orally ingested caffeine is able to reduce the free radicals caused by sun exposure and increase the antioxidant effect of some of the previously mentioned polyphenols. A study measuring the antioxidant component in caffeinated and decaffeinated beverages demonstrated a dramatically higher level of this activity in the beverages containing caffeine.

More exciting than its antioxidant value is caffeine's contribution to ridding the skin of damaged cells. The process by which a cell dies is called apoptosis. Apoptosis is a complex biological process that involves multiple chemical reactions and ultimately leads to damaged cells being completely engulfed and recycled. This happens throughout the body thousands of times over every day. As it relates to skin cancer prevention, caffeine increases the body's ability to identify and rid the skin of damaged cells that could lead to the formation of skin cancer. One of the steps in this complex process involves cells called killer T cells that are responsible for instigating the destruction of damaged keratinocytes. Many other proteins and biomolecules work in conjunction in the process of apoptosis to destroy the unhealthy cell. This is extraordinarily powerful, as we know that some UV radiation will always get by even the most effective of all SPF products. We can add additional topical antioxidants, but what happens if DNA damage occurs despite our most diligent efforts? Knowing that caffeine adds this increased ability to purge damaged cells prior to their development into a tumor is unprecedented.

### The Next Generation in Protection

In order to take full advantage of caffeine's sun protection benefits, look for well-formulated topicals that contain the ingredient to add to your patient's daytime regimens. One challenge, as we know too well, is patient compliance. Finding a sunscreen product for daily use that contains sun protection ingredients, antioxidants and caffeine within its formulation will simplify regimens and increase the likelihood that our patients will be able to reap the full benefits of this new line of defense against UV exposure.