

An In-Depth Look at Lilac Stem Cell Extract in Skin Care

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Science and technology have become integral partners in developing the active ingredients utilized in today's advanced topical skincare products, and stem cells are one category of ingredients that are continuously proving themselves invaluable. Although technically advanced and proven safe, there has been a lot of confusion and controversy surrounding the use of stem cells overall. Using plant stem cells rather than human stem cells in product formulations is desirable not only because they provide a myriad of benefits in treating many common skin conditions, but because they also do not create the controversy associated with the extraction and use of human stem cells.

While the three most popular plant stem cells with the most scientific investigation are *Malus Domestica* (swiss apple), *Vitis Vinifera* (grape fruit) and *Syringa Vulgaris* (lilac leaf), this article will focus on the latter, as this particular extract—the active component of which is verbascoside—possesses multi-faceted benefits, and may be used in the treatment of commonly seen inflammatory, acneic, aging, and photodamaged skin conditions.

HUMAN EPIDERMAL STEM CELL FUNCTION

It is useful to understand the function of epidermal stem cells within human skin prior to considering incorporating plant stem cells into topical products. Some of the skin's stem cells are located within the stratum basale (basal layer) of the epidermis (known as interfollicular stem cells). The primary function of these cells is to replenish the epidermis during regular wound repair and homeostasis.¹ These cells are undifferentiated—as with all stem cells—and have the ability to differentiate into many lineages depending upon their tissue origin, for an extended period

of time.^{1,2} Upon dividing, the daughter cells may remain as the parent cell, or they have the ability to differentiate into cells that have a more specific function, otherwise known as progenitor cells.

Over approximately one month, these progenitor cells divide rapidly within the basal layer, and when this division process ends, they move through the upper layers of the epidermis towards the surface of the skin. At this time they continue to differentiate progressively, changing from one type of keratin to another until their nuclei degenerate, and they become dead, keratinized cells that form the outermost layer of the skin and eventually shed off.²

In addition, epidermal stem cells are also found at the base of the hair follicle in a microenvironment called the bulge (known as bulge stem cells). Until they are called upon by surrounding cells to aid with skin repair, these stem cells remain dormant, and it is the epigenetic signal that these cells receive that will determine their particular characteristics.

CELLULAR DAMAGE

Even though epidermal stem cells support constant skin renewal, this process becomes slower with age. One thought is that the healing process in aging adults slows due to the stem cells' compromised mobility or a reduction in the actual number of stem cells that are able to respond to the signals that encourage proliferation.³ Over time, the number of lost or dying cells becomes greater than that of the existing cells, which ultimately leads to the visible signs of skin aging, such as wrinkles and sagging. Overexposure to UVA and UVB rays also contributes to additional presentations of visible skin damage, such

as several types of cancers, photoaging, pigmentation disorders, inflammation, erythema, and sunburn.^{4,5} DNA damage has been proven to occur from the resultant oxidative stress from both direct and indirect UVA and UVB exposure.⁶ Reactive Oxygen Species (ROS) are generated by UV radiation, which alter the function of the skin by interacting with the DNA, lipids, and proteins within the skin's cells. Although the skin is armed with a natural defense mechanism consisting of antioxidants and enzymes to protect it from ROS, it can become overwhelmed with a UV-induced increase in the production of ROS.

CELLULAR PROTECTION AND REPAIR

Not only does verbascoside possess strong antioxidant properties,^{7,8} but *in vivo* and *in vitro* studies have also shown anti-inflammatory capabilities stronger than those of both hydrocortisone and triamcinolone, as well as the ability to accelerate the wound-healing process. Verbascode is also able to attract pro-inflammatory cells in the areas of damaged skin that function to inhibit ROS.⁹ In fact, one study indicates that verbascoside's mechanism of action with regard to the repair of DNA oxidative damage is related to its ability to significantly impair NF- κ B and AP-1 binding activity. Science also suggests that verbascoside offers additional skin-protection capabilities against environmental and inflammatory insults.

Along with the cutaneous benefits of verbascoside mentioned above, making it ideal for aging and inflamed skin concerns, this plant is also capable of suppressing the enzyme tyrosinase—a key factor in the melanogenesis process, which ultimately leads to the deposition of hyperpigmentation. Verbascode has also been shown to suppress the 5- α reductase enzyme that triggers sebum activity—one of the four contributing factors in the pathogenesis of acne.

VERBASCOSIDE IN PRODUCT FORMULATION

Currently, advanced topical products are available through physicians and skin care clinicians that feature verbascoside in conjunction with other active ingredients. Some formulations combine L-ascorbic acid, hyaluronic acid, ergothioneine, and glutathione in addition to verbascoside. This type of formulation would be beneficial to aging patients with any combination of dryness, adult acne, or hyperpigmentation to provide hydration, superior antioxidant protection, and the pigment-inhibiting capabilities of both the verbascoside and L-ascorbic acid. For oily, acneic patients who also suffer with the resultant post-inflammatory hyperpigmentation (PIH), formulations combining verbascoside with pure retinol and other support ingredients such as licorice extract,

gluconolactone, and phenylethyl resorcinol will address the over-production of sebum, assist with cell turnover and suppress multiple reactions in the melanogenesis pathway.

By using products containing this advanced plant stem cell extract, patients of all ages will be able to improve their skin function and provide necessary protection to the skin's delicately balanced process of renewal.

SCIENCE AND TECHNOLOGY CONTINUES TO ADVANCE

Stem cell technology has now advanced to where replacing damaged skin cells, rather than just repairing them, may be possible. It is clear that these types of extracts will continue to play a key role in fighting many common skin conditions moving forward. While research and science validates some types of plant-derived stem cell extracts, proving the efficacy of others requires further study prior to their wide usage. It is important to stay current with research regarding plant stem cell technology in order to stay on the cutting edge of product formulation and incorporate this science into topical formulations to promote skin health.

By developing a greater understanding of today's advanced product formulations and ingredient mechanisms of action, especially those that include stem cells, physicians and skin care professionals will be better able to provide comprehensive skin care regimens in order to provide the best possible solutions for each patient, and their unique skin types and concerns. ■

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