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WHERE HEALING HAPPENS™

VINIFERAMINE®

MOLECULES&HEALTH
HEALING THROUGH MODERN SCIENCE WITH SMALL MOLECULE TECHNOLOGIES

Reducing Dermal Scarring

Scars are areas of dermal fibrosis that replaces normal tissue after injury and during wound healing.

There are several types of dermal scars including:

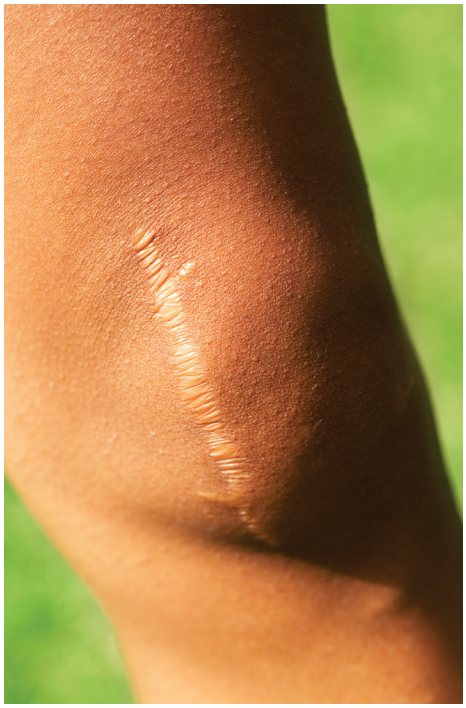
1. Atrophic scars that appear as sunken or pitted areas of skin
2. Hypertophic scars that are characterized by raised areas of skin
3. Keloid scars characterized by growth outside the original wound area
4. Striae distensae (stretch marks) characterized by linear bands of atrophic-appearing skin.

Wound healing involves 4 critical phases that overlap: the coagulation phase, the inflammatory phase, the migration-proliferation phase (development of granulation tissue), and the remodeling-regeneration phase that includes maturation, scar formation and re-epithelialization. The magnitude of the second phase, inflammation, affects the amount of scar tissue that is produced at the conclusion of the healing process. Regeneration is thought of as replacement of tissue, however, scar formation actually involves a progressive remodeling of granulation tissue. In fact, scars are defined as dermal fibrous replacement tissue that results from a wound that has healed by resolution (rather than regeneration).

Scarring typically occurs following damage to more than 33% of the skin thickness from trauma or surgery. Can skin damaged in this way ever heal without scarring? Actually, complete regeneration occurs exclusively in lower vertebrates. Scarless healing in humans only occurs in early embryo development. So, why do we form scars after early development? One theory suggests that wound healing in mammals is optimized for fast healing in a fast-moving, microbial-rich environment. Rapid inflammatory responses may allow quick healing to prevent infections.

Scar tissue is composed mostly of disorganized collagen-rich extracellular matrix produced by skin cells called myofibroblasts, which are stimulated by the signaling molecule (cytokine), transforming growth factor beta (TGF-beta). Typically, myofibroblasts are programmed to die in a process called apoptosis that leaves a normal scar, however, in some pathological conditions these cells fail to undergo cell death and persist, as in the case of excessive scarring.

Scars may seem trivial, however, scar tissue is weaker than normal tissue, and scars can cause many problems including limited joint mobility, growth impairment and loss of normal skin function. In addition, scars can be disfiguring and may cause severe itching, tenderness, pain, sleep disturbance, and anxiety, particularly in the case of excessive scars that can develop after trauma to the deep dermis such as from burns or



lacerations. Excessive or pathological scars including hypertrophic scars and keloids may be caused by the dysregulation of collagen synthesis. As mentioned, excessive inflammation during wound healing affects the degree of scarring.

Many of the extraordinary ingredients in Viniferamine® At Home™ skin and wound care products are anti-inflammatory including the polyphenol resveratrol from grapevines, the polyphenol epigallocatechin-3-gallate (EGCG) from green tea, and the polyphenol oleuropein from olive leaves. In addition, Viniferamine® At Home™ skin and wound care products contain other ingredients that are anti-inflammatory including asi-

aticoside, a component of titrated extract of *Centella asiatica* (TECA) and the important antioxidant, melatonin.

Resveratrol has also been shown to inhibit growth and induce apoptosis in keloid fibroblasts. In addition, resveratrol decreases the production of TGF-beta by human keloid fibroblasts, suggesting that resveratrol may help in the treatment of keloids. Furthermore, resveratrol has been shown to reduce collagen production in human hypertrophic scar fibroblasts by inhibiting proliferation and inducing apoptosis.

Oleuropein has been used in a scar management program due to the fact that exuberant inflammation can be downregulated or modulated by oleuropein.

EGCG has been shown to decrease collagen expression in normal human and keloid (human) fibroblasts, and attenuate the TGF-beta-induced differentiation of myofibroblasts, suggesting that EGCG may have a role in improving wound healing and scarring.

Asiaticoside has been shown to reduce scarring and decrease TGF-beta expression in a rabbit ear model of hypertrophic scarring. In addition, asiaticoside was shown to suppress collagen expression and TGF signaling in normal human fibroblasts, human keloid fibroblasts, and human hypertrophic scar fibroblasts.

It has been shown that scars have increased transepidermal loss (TEWL). Changes in skin barrier function are clearly evident with scarring. Hydration is important for reducing scarring since it reduces water loss and restores homeostasis to the scar reducing collagen deposition and excessive scar formation. Dipotassium glycyrrhizate promotes skin hydration by maintaining levels of hyaluronic acid, which has a high capacity for retaining water. Hyaluronic acid has also been shown to reduce dermal scarring. In addition, one of the most consistently successful hydrating agents used in scar management has been silicone in dimethicone topical applications. Viniferamine® At Home™ skin care products contain beneficial ingredients including dipotassium glycyrrhizate and dimethicone to improve and maintain skin hydration.

It's good to know that beneficial ingredients in Viniferamine® At Home™ skin and wound care products help protect against excessive inflammation, promote normal wound healing and improve skin hydration to reduce dermal scarring.

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