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Ask the DOCTOR

Protecting Hands Against Unsightly Aging

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Q: “I take excellent care of my face by using various skin products and following a healthy lifestyle, but hobbies like gardening make my hands look a lot older than they are. What can I do to improve the appearance of my hands, particularly the skin on the back of my hands?”

A: The skin on the back of the hands, with its spots, wrinkles, dryness, and sagginess, bears mute but unmistakable witness to the passage of time. It is important to know how time and circumstances work to produce these physical changes and what you can do to prevent, delay, and even reverse them.



UNDERSTANDING HOW SKIN AGES

As we age, our skin cells become less and less capable of producing the energy needed for DNA repair and cell renewal. Our bodies' natural supply of internal antioxidants such as superoxide dismutase (SOD) and catalase also diminishes. This allows free radicals generated by ultraviolet light, smog, cigarette smoke, X-rays, drugs, and other factors to inflict cumulative damage to the lipid bilayer that covers our skin cells. This constant oxidative assault also causes the fatty membranes of cells to become more permeable, with the result that our skin gradually loses moisture and becomes dehydrated.

Aging likewise involves a progressive decline in the body's ability to synthesize essential fatty acids required by the skin to maintain adequate moisture. In addition, the skin's ability to retain moisture is directly related to its NaPCA content. One of the skin's most important natural moisturizers, NaPCA (sodium pyrrolidone carboxylic acid) facilitates the hydration of skin by absorbing water from the air. As skin ages, however, the amount of NaPCA it contains is reduced by about half, further contributing to the unsightly effects of dehydration.

Collagen, the primary protein in the skin's connective tissue, is especially susceptible to free-radical damage, and this accounts for the sagginess and wrinkles so often seen in aged skin. Normal, healthy collagen proteins gently mesh with each other, giving the skin its softness and elasticity. Free-radical damage causes collagen protein molecules to break down and re-link in a different way, in a process known as cross-linking that causes normally supple collagen to become stiff and hard. Unable to retain water and remain plump,¹ cross-linked collagen fibers ultimately collapse in on themselves, manifesting as wrinkles on the skin's surface.²

Age spots, another common skin feature associated with aging, are caused by specialized skin cells known as melanocytes, which make up about 8-10% of the epidermal skin cells. Melanocytes continually release small amounts of brown-black pigment called melanin, which determines normal skin color and also helps protect the skin by limiting the penetration of ultraviolet light into the epidermis and by scavenging DNA-damaging free radicals. As skin ages, these melanocytes grow fewer in number and often cluster together, appearing as brown, or even black, patches on your skin.³

ANTIOXIDANTS REPAIR AND REJUVENATE SKIN

Although the aging process and its adverse effects on your skin may seem both relentless and inevitable, a number of natural compounds have been scientifically shown to support the repair mechanisms of skin cells and boost their healing capabilities.

One group of compounds that effectively counteract the damaging effects of free radicals are antioxidants. Topically applied antioxidants confer significant protection against free-radical assault and even partially reverse some aspects of skin aging. Several noted animal and human studies have demonstrated that antioxidants of low molecular weight, such as vitamin E and

alpha-lipoic acid, exert strong protective effects against free-radical damage.⁴

Administration of topical vitamin E—particularly of the alpha-tocopherol form of the vitamin—decreases skin roughness and wrinkle depth. In one study, alpha tocopherol also acted as a potent scavenger of free radicals,⁵ arresting the oxidative damage that can ultimately destroy collagen fibers.

Alpha-lipoic acid is a versatile antioxidant that increases the beneficial effects of other antioxidants. Found in the mitochondria that generate the energy required for DNA repair and cellular renewal, alpha-lipoic acid is both water- and fat-soluble, and augments cellular metabolism. Alpha-lipoic acid also “turns off” a dangerous transcription factor known as nuclear factor-kappa b that causes inflammation.

Another factor known as AP-1 (activating protein-1) can either damage or heal skin, depending on how it is activated. If activated by ultraviolet light, AP-1 produces widespread free-radical damage. If activated by alpha-lipoic acid, however, AP-1 turns on enzymes that digest only damaged collagen.

As skin ages, sugar molecules bind tightly to proteins and form abnormal structures known as advanced glycation end products, which progressively decrease tissue elasticity. Alpha-lipoic acid effectively retards this process of glycation and, by activating AP-1, produces skin that is smoother and firmer.

Due to its ability to induce superoxide dismutase (SOD) activity, red tea extract exerts antioxidant effects that are approximately 50 times greater than those of green tea. Red tea extract contains potent, protective natural antioxidants and enzymes, such as vitamins C and E and beta-carotene, which facilitate skin cell renewal, giving skin a smoother, brighter, and healthier appearance.

MOISTURIZERS SOFTEN DRY, ROUGH SKIN

Another critical group of nutrients required for healthy skin are natural moisturizing agents that protect against dehydration. One of the most important of these is hyaluronic acid, a large sugar-like molecule found in every tissue of the body, particularly in collagen-rich connective tissues.

The network of collagen fibers below the skin is filled with a jelly-like mixture of water, protein complexes, and hyaluronic acid, which facilitates the transport of essential nutrients from the bloodstream to the living cells of the skin. Hyaluronic acid is critical to this mixture because of its ability to attract and bind with water. Unfortunately, due to damaging free radicals, up to half of our hyaluronic acid reserves are depleted by the time we turn 50. Replenishing the skin with hyaluronic acid promotes healing, repair, and antioxidant activity.⁶ Hyaluronic acid also provides volume and fullness, and is crucial in maintaining smoothness and moisture in the skin.⁷



COMPOUNDS TO REJUVENATE OLD SKIN CELLS

The fat-soluble antioxidant CoQ10 is highly effective in countering the normal decline in mitochondrial energy production that accompanies aging.⁸ Coenzyme Q10 is especially important for aging skin due to its essential role in assisting fibroblast cells.

Fibroblasts produce the essential proteins collagen and elastin, which provide structural support and elasticity for your skin. As we age, these fibroblast cells start to develop dramatic mitochondrial dysfunction,⁸ rendering them less able to produce the energy needed to fulfill their role in supporting the skin. This energy deficit contributes to many visible signs of skin aging.^{9,10} Topical use of CoQ10 restores deficient CoQ10 levels in these skin cells and thus helps to combat the underlying causes of skin sagging and wrinkling.¹¹

Another nutrient that fights sagging caused by the destruction of the skin's underlying collagen structure is DMAE (dimethylaminoethanol). In one study, DMAE was shown to produce a firming effect on the skin,¹² perhaps because DMAE helps to stabilize cell membranes. Based on clinical reports, DMAE may be the first topical agent that can help firm sagging skin directly. DMAE also greatly increases the skin's radiance, tone, and firmness, while decreasing micro-inflammation.

Retinol, a pure and active form of vitamin A, is one of the few substances with a molecular structure small enough to penetrate to the skin's lower layers, where collagen and elastin reside. By stimulating collagen and elastin, vitamin A derivatives create firmer, smoother skin and also work to increase cell turnover by stimulating the production of new cells underneath the skin's surface. This accelerated cell turnover promotes the exfoliation of dead skin cells and allows healthier cells to appear. As a result, the skin appears softer and smoother, and signs of aging start to diminish.

LIGHTENING AGENTS IMPROVE SKIN TONE AND COLOR

The final group of compounds that can improve the health and appearance of aged skin are skin-lightening agents. These compounds help reduce unsightly, mottled areas of hyperpigmentation where melanin has pooled underneath the skin. Two ingredients that appear to work synergistically to address this condition are N-acetyl glucosamine and niacinamide.

Glucosamine's anti-inflammatory and antioxidant effects in promoting joint health are well established. Only recently, however, have scientists shown that these same properties help improve skin health as well. N-acetyl glucosamine, a more stable version of glucosamine, inhibits the glycosylation of pro-tyrosinase, a process that is central to the overproduction of melanin in skin cells damaged by ultraviolet light.

When combined with niacinamide, a vitamin B derivative, N-acetyl glucosamine is more effective in reducing hyperpigmentation than niacinamide or N-acetyl glucosamine alone. Treatment with N-acetyl glucosamine and niacinamide reduced both the size of hyperpigmented spots and improved the consistency of melanin distribution in the skin. In-vitro studies of human skin cultures also found that N-acetyl glucosamine and niacinamide stimulated the production of hyaluronic acid and increased healthy collagen expression.¹³ This improved hydration of the skin helps reduce the appearance of fine lines and wrinkles.



SKIN SOLUTIONS FOR AGING HANDS

To diminish the unsightly signs of aging on the hands, COSMESIS Skin Care has incorporated the various compounds discussed in this article in a product called Anti-Oxidant Rejuvenating Hand Cream. This scientifically formulated skin cream also contains health-promoting nutrients such as grape seed oil, orange flower, chamomile, and sage. It helps minimize signs of aging often seen on the back of the hands, such as dry, veiny skin and unwanted pigmentation, discoloration, and age spots.

Anti-Oxidant Rejuvenating Hand Cream is mild enough to be used in conjunction with other skin treatments or products. Applying the cream once or twice daily to the back of the hands will smooth and nourish the skin, lighten age spots and discoloration, lessen the appearance of unsightly veins, and decrease wrinkles.

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