

TREATING SKIN AGING

What causes skin to age?

Skin aging involves two processes, intrinsic “chronological” aging & extrinsic “photoaging.” While intrinsic aging is largely caused by genetic factors, the effects of gravity, facial expression and hormonal changes are also important. Although skin may appear superficially unblemished, it is thin, wrinkled and loses elasticity, causing it to sag. The effects of intrinsic aging are predominantly treated surgically. Extrinsic photoaging is caused primarily by sun damage. Free radicals generated by UVA (315-400nm) and UVB (280-315nm) light are believed to be responsible for the majority of cellular damage observed in this form of aging. This cell damage includes DNA mutations, structural and enzymatic protein alterations, lipid peroxidation and activation of metalloproteinases, which break down collagen in the dermis. These cellular changes cause skin to appear dull, thick, leathery, wrinkled, rough and sallow. Other observable features may include telangiectasia, mottled hyperpigmentation and premalignant or malignant skin lesions. The effects of photoaging can be managed with at-home topical skin products, office treatments (such as Botox and fillers), and/or skin resurfacing (chemical peels, lasers and/or intense pulsed light).

Sunscreens

The most fundamental part of preventing and treating skin aging is sun protection. Sunscreens and other barrier methods of avoiding sun exposure – such as hats, protective clothing, driving gloves and avoiding the midday sun – are essential for minimizing extrinsic photoaging. It is futile to spend time and money in an effort to treat the effects of aging if one isn’t using a broad-spectrum sunscreen daily in conjunction with other methods of avoiding sun exposure. It is important to remember that sun damage can occur in the absence of sunburn. There are two categories of sunscreen – chemical and mineral. Chemical sunscreens are filters. Chemicals are absorbed into the skin before acting to prevent sun damage from within. Mineral sunscreens such as titanium dioxide and zinc oxide are considered superior, because they sit on the surface of the skin and act as a physical barrier against the sun’s rays. These minerals are inert and therefore are used in sunscreens for children or for people with sensitive skin, because they are much less likely to cause irritation or allergy. There are also a number of invisible zinc sunscreens commercially available. The main problems with mineral sunscreens are that they are often thick and uncomfortable to wear, and they give rise to an unattractive whitish sheen when applied to skin. When choosing a sunscreen preparation it is important to make sure it is truly broad spectrum (that is, it covers both the UVA and UVB spectrums). Look for the words “Broad Spectrum” on the bottle as these words are regulated by the FDA. Although most sunscreens cover UVB (evidenced by an SPF of 15, 30 or higher), not all cover UVA. Some

ingredients that block UVA rays include titanium dioxide, zinc oxide, avobenzone (Parsol 1789), and ecamsule (Mexoryl SX).

At-Home Treatments

Topical retinoids - Tretinoin (Retin-A, Renova), adapalene, & tazarotene

Tretinoin is a hormone that binds to retinoic acid receptors on skin cells and exerts many effects. It is a prescription medication approved by the Food and Drug Administration (FDA) in 1971 to treat acne because of its proven comedolytic activity. It was discovered, however, that the drug also improves skin texture, color and leads to partial reversal of photoaging when used over an extended period of time. Tretinoin exfoliates (removes top layers of skin cells) the skin, helps even out pigmentation and minimizes fine lines by plumping collagen and through many of its other histological effects. Histological changes observable in the epidermis include thinning of a thickened stratum corneum, reversal of atypia and uniform dispersion of melanin. Dermal changes include increased collagen synthesis and angiogenesis. Clinically observable changes in skin texture and pigmentation may be evident after 1-2 months of daily use. Improvement in fine wrinkling and pore size may be evident after six months of daily use. In addition, human studies have found tretinoin to be noncarcinogenic and can prevent the formation of UV-induced lesions. It can be considered for chemo prevention in patients at high risk of basal or squamous cell carcinoma. Tretinoin or Retin-A should not be confused with retinol widely available in over-the-counter preparations. Evidence for the efficacy of these substances is questionable. However, there are other topical retinoids and retinoid analogues such as adapalene and tazarotene which may work as well or better than tretinoin. Tretinoin should not be used during pregnancy because it is potentially teratogenic. Other risks of tretinoin include sun sensitivity and possible irritation. This temporary irritation usually lasts about six weeks, depending on the amount of damaged skin present. A person who has extensive sun damage may peel beyond the usual six weeks. Tingling or slight stinging upon application, temporary increased redness and intermittent peeling of skin is common. Acne can actually flare initially, because retinoids tend to reveal what's hiding under the surface. With prolonged use, though, acne and enlarged sebaceous glands can be minimized. To help minimize irritation, patients should use the smallest amount possible and keep away from eyes, corner of nose and mouth. If burning, discomfort, itching, or excessive bothersome peeling occurs, take one to two nights off of the retinoid. Moisturize during the break and then resume the retinoid. Patients should avoid missing more than two days of the retinoid, to minimize the duration of the irritation phase. If facial waxing is desired, patients should discontinue total use of the retinoid for five to seven days prior to waxing and resume the day after to prevent a burn effect. Also be cautious when using pore strips in conjunction with a retinoid. To avoid preventable irritation, decrease the duration of application of the pore strip to the minimal duration recommended in the package insert.

Alpha hydroxy acids

Alpha hydroxyl acids (AHA), such as glycolic acid and lactic acid, are primarily used as chemical exfoliants. In low concentrations they cause desquamation of the stratum corneum by disrupting cellular adhesion, while higher concentrations cause epidermolysis. Long-term use of these substances leads to increased collagen and elastin synthesis, and increased glycosaminoglycan concentration in the dermis. Clinically, concentrations less than 10% improve skin texture and pigmentation, while higher concentrations lead to improvement in fine wrinkling. AHA are considered safe in pregnancy and cause less skin irritation than tretinoin. They are available over the counter in concentrations of 2-20%. Many AHA products available from pharmacies display the AHA concentration on the label (eg Neostrata). Concentrations of 20-70% are used in office "peels". They may be used alone or in combination with tretinoin and depigmenting agents. Side effects of AHA's include mild irritation and sun sensitivity.

Depigmenting agents

Depigmenting agents block melanin production, reducing the intensity of lentigos, freckles and melasma. Patients need to be informed that results may not be apparent for several months, and pigmentation may return within six months of discontinuing treatment. Patients should avoid sun exposure when using these substances.

The most commonly used depigmenting agent, hydroquinone, is available in over-the-counter concentrations of up to 2%. Concentrations of 4% or over require prescription. Hydroquinone can sometimes irritate and redden the skin. It is possible that the irritation associated with hydroquinone can over stimulate the higher concentration of melanocytes found in dark skin types and can ironically lead to hyperpigmentation (dark spotting). Another rare side effect of hydroquinone is exogenous ochronosis, which is an irreversible blue-black color to the skin. So if any worsening of color, one should stop hydroquinone and call for re-evaluation. Consider taking a few month break from hydroquinone every few months as there have been reports of this decreasing the incidence of side effects.

Kojic acid – a by-product of the rice wine industry – also blocks melanin production. It is not commonly used in commercial preparations, because it tends to be chemically unstable. Both hydroquinone and kojic acid are more effective when used in combination with tretinoin or glycolic acid.

Mechanical Exfoliants

Exfoliation involves the removal of the most superficial layer of the epidermis, the stratum corneum. This layer is acellular, giving the skin a dull appearance. There are two types of

exfoliants – chemical exfoliants (such as tretinoin, AHA's and chemical peels discussed above) and mechanical exfoliants (which include scrubs and microdermabrasion). Chemical exfoliants seem to have superior results to mechanical ones.

Other cosmeceuticals

There are countless other cosmeceuticals. Many of the active ingredients used in these products could prove to be effective in the future, but high quality trials are required to establish their efficacy. Although some substances that are known to be beneficial in wound healing are also used in cosmeceuticals, there may be no correlation between their role in wound healing and their efficacy in treating aging. Other substances that are useful in vitro become unstable and ineffective when exposed to light and air.

Examples of cosmeceuticals that may prove to be beneficial include retinols, copper, growth factors, vitamins C and E, amino acids, Coenzyme Q10, hyaluronic acid, carotenes, alpha lipoic acid and other antioxidants. As these substances are not harmful and may yet prove to be effective, patients may want to use these in conjunction with sunscreen and other evidence-based cosmeceuticals.

Office Procedures

Botox is a popular injection that can be done during any office visit to block the nerve impulses to temporarily paralyze muscles that cause wrinkles in the upper face. Fillers such as Restylane, Juvederm or Radiesse are half hour procedures to inject materials to temporarily fill in wrinkles of the lower face. Chemical peels, lasers, and/or intense pulsed light can sometimes add to the effect of a good at-home topical regimen.

Plastic Surgery

A face lift or blepharoplasty (cosmetic eye surgery) is surgery that is best preferred by a board certified plastic surgeon.

Summary

At night, in order to reverse some of the effects of photoaging, patients are commonly treated with a retinoid (commonly tretinoin), glycolic acid or depigmenting agents, either alone or in various combinations. It is also imperative that all patients use a sunscreen every morning. The brand does not matter as long as it says "broad spectrum" and has an SPF of 30. In addition, some patients pursue Botox injections, injections of fillers, peels, laser, and/or plastic surgery.