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Healthy Aging

AGE MANAGEMENT MEDICINE FOR PHYSICIANS

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Healthy Skin Is Beautiful Skin

New ingredients, sunscreen and vitamin C can strengthen the skin's extracellular matrix.

As the body's largest organ, the skin is an outward sign of inner health. Therefore, the same poor lifestyle choices that negatively affect the heart and lungs also damage the strength and health of our skin. Smoking, overconsumption of carbonated and/or alcoholic beverages and sleep deprivation decrease the amount of blood, oxygen and nutrients supplied to the skin. The result is premature wrinkles, dryness and a dull complexion.

The skin is a complex structure. Its extracellular matrix (ECM) is made up of structural proteins (collagen and elastin), adhesive proteins (laminins and fibronectin), glycosaminoglycans (GAGs) and proteoglycans. Together, these provide strength, elasticity, fullness and structure to the skin.

To maintain healthy skin, we need to continually reinforce the ECM. To help us do this, numerous topical skin care options protect, support and restore this complex and vital structure. Among them are matrix metalloproteinase inhibitors, peptides, broad-spectrum sunscreens and vitamin C.

Healthy skin maintains a balance between synthesis and degradation of collagen, elastin and GAGs. Matrix metalloproteinases (MMP) are enzymes in the body that break down the useless fragments of old ECM, as well as destroy healthy and necessary components.

Vitamins are playing increasingly important roles in cosmeceuticals: Vitamin A minimizes the appearance of fine lines. Vitamin C stimulates collagen and helps firm skin. Vitamin E works as an antioxidant.

Source: Packaged Facts



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Some common MMP are collagenase, elastase and hyaluronidase, which break down collagen, elastin and hyaluronic acid.

Aging, sustained UV exposure and oxidative stresses stimulate the production and activity of MMP. Because a healthy and strong ECM is critical to youthful skin, the science of MMPi or matrix metalloproteinase inhibitors has gained a new importance in cosmeceuticals.

Many MMPi, such as ascorbic acid, resveratrol and epigallocatechin gallate (EGCG) from green tea, are ingredients known for their antioxidant characteristics. These ingredients offer many topical benefits for the skin. For example, a study outlined in the journal *Toxicology and Applied Pharmacology* found that resveratrol, applied topically to mouse skin, showed a significant inhibition of UVB-mediated induction of cyclooxygenase and ornithine decarboxylase (ODC) enzyme activities. It also inhibited the protein expression of ODC, which are well established markers for tumor promotion. The study also observed that resveratrol inhibits UVB-mediated increases in lipid peroxidation, a marker of oxidative stress.¹

In a study funded by The National Cancer Institute, Stephen Hsu, PhD, of the Medical College of Georgia found that EGCG not only lowered the amount of oxidative stressors in healthy cells, but it also increased the amount in cancerous cells, protecting the beneficial and breaking down the dangerous.²

Also showing strong promise for improving the signs of skin aging are several new targeted peptides. Topical application of these types of ingredients, in tandem with healthy lifestyle choices, helps protect the existing matrix components.

Peptides and the ECM

Although peptides have been used by the medical community since the mid-1900s, they have only recently been developed for cosmetic use. As is widely known, peptides are natural or synthetic compounds containing two or more amino acids linked by the carboxyl group of one amino acid to the amino group of another, forming a peptide bond. Depending on its particular size and structure, a peptide is targeted to perform a specific function in the skin.

Some peptides help reduce wrinkle for-

mation by minimizing the strength and frequency of the muscle contractions in areas such as the glabella (above and between the eyebrows) and in the periorbital areas. Other peptides are structured to stimulate the fibroblasts to produce collagen, (types I and IV collagen that represent the tissues and the basal layer), as well as elastin. These are particularly critical to the aging or damaged matrix. In addition, some peptides help develop fibronectin and GAGs. The result includes increased skin thickness, minimized wrinkles and an evening of skin tone and texture.

Of the myriad peptides being introduced to the cosmeceutical industry, only a few have published studies in peer-reviewed journals documenting their efficacy: palmitoyl pentapeptide-4 and acetyl hexapeptide-8. Several others of particular interest are palmitoyl tetrapeptide-7, palmitoyl oligopeptide and dipeptide-2, although more clinical studies will need to prove their efficacy.

Palmitoyl Pentapeptide-4. Otherwise known as Matrixyl,[®] this peptide stimulates skin fibroblasts to reconstitute the ECM by increasing type I and IV collagen fibronectin.³ Increasing collagen deposition is an effective way to combat the outward signs of skin aging.

Acetyl Hexapeptide-8. Sold under the trade name of Argireline, this synthetic peptide minimizes existing lines and wrinkles and prevents new ones from forming. It does this by inhibiting the SNARE complex—a natural formation of proteins in aging skin that stimulate neurotransmitters. These neurotransmitters cause the facial muscle contractions that lead to wrinkles and lines. It also prevents the overproduction of catecholamines, which reduce the amount of blood going to the skin.⁴

Palmitoyl Tetrapeptide-7, Palmitoyl Oligopeptide and Dipeptide-2 are also being used in cosmetic preparations for suggested benefits, ranging from collagen synthesis to increased lymphatic circulation. More studies are needed, however, to substantiate these manufacturer-supplied claims.

Broad-Spectrum Sun Protection

UVA and UVB radiation have been linked to myriad issues, including premature aging, skin discoloration, skin cancer and

a weakening of the immune system. The ozone layer cannot absorb UVA rays, so they penetrate more deeply into the skin. UVB rays cause sunburn and affect the surface layers of the skin. Therefore, people should use a broad-spectrum sun protection moisturizer with an SPF of 15 or higher to protect the skin. This is an integral part of any daily skin care regimen.

Two types of sun protection are available: chemical sunscreens and physical sunblocks. These two forms of protection have different methods of achieving a similar goal. A chemical sunscreen absorbs, reflects and scatters UV radiation before it harms the skin. A physical sunblock sits on the surface of the skin where it reflects or scatters UV radiation before it damages the skin.

Chemical sunscreens are often preferred to physical sunblocks because they work well for almost every skin type and condition. Furthermore, they don't leave a chalky film on people with darker skin tones. Chemical sunscreens also have a lighter, smoother feel in contrast to the heavy feel of most physical blocks. The cosmetic elegance and appeal of an SPF moisturizer typically increases the likelihood of daily patient compliance.

Vitamin C and the Skin

Topical vitamin C is effective in preventing skin damage and treating compromised skin. This antioxidant is essential for healthy skin, but is not produced by the human body. For this reason, skin care regimens must be supplemented with topical vitamin C products. However, just because a product label lists vitamin C as an ingredient doesn't mean it contains a bioavailable form of it.

In fact, L-ascorbic acid is the only form of vitamin C that's effectively assimilated into the body topically and orally. However, L-ascorbic acid is difficult to formulate in a stable preparation for cosmetic use. Because of this inherent problem, many skin care formulations use vitamin C derivatives that are more stable

in formulations. But the skin simply cannot use them. Some of these derivatives can even cause additional damage to the skin, including an increase in lipid peroxidation and topical irritation.⁵

Vitamin C in Skin Care

Recent studies show the numerous positive effects of vitamin C on the skin. L-ascorbic acid acts as an antioxidant in the skin, scavenging harmful free radicals created by sunlight, smoking, pesticides, heat, cold and pollution. It's also effective in counteracting the effects of these oxidative stresses. For example, it can reduce wrinkling, photodamage, dehydration and brown spots by stimulating fibroblasts to produce collagen and inhibiting tyrosinase to minimize discoloration.⁶

In another study on vitamin C, Lin et al. established that topical L-ascorbic acid (15 percent) had an antioxidant and photoprotection effect on pig skin, whether applied alone or with alpha-tocopherol (vitamin E).⁷

A study by Traikovich involving daily application of a 10 percent L-ascorbic acid serum over a three-month period showed a statistically significant improvement in photodamaged facial skin in 84.2 percent of treated patients over placebo patients.⁸ When used properly, vitamin C can play a significant role in protecting the skin, as well as treating it after damage has occurred.

Benefits of L-Ascorbic Acid

Many skin care products that claim to contain vitamin C do not contain L-ascorbic acid. Instead, they contain vitamin C derivatives, such as magnesium ascorbyl phosphate, sodium ascorbyl phosphate, ascorbyl palmitate or ascorbyl glucoside. These compounds are ascorbic acid bound to other molecules, creating a substance much more easily stabilized in cosmetic preparations. Unfortunately, the skin's environment is not corrosive enough to break these bonds, making these compounds of little value to the skin.

In a study by Meves A. et al., ascorbic acid-6-palmitate was tested for its ability to delay the onset of ultraviolet B-radiation-induced skin wrinkling. This widely used vitamin C derivative actually strongly promoted ultraviolet B-induced lipid peroxidation, which causes cellular damage and increases free radical production.⁵

Finding a Suitable Product

So how do you evaluate a topical vitamin C skin care product? Answering the following questions can help you make an appropriate evaluation.

- *Is the vitamin C in the form of L-ascorbic acid?* L-ascorbic acid is the best form of vitamin C for use on the skin. Derivatives are typically not absorbed and, in some cases, can intensify existing damage, as proven by the Meves et al. study cited above.

- *Is the L-ascorbic acid at a low pH so it can penetrate the skin?* In vitro studies demonstrate that L-ascorbic acid should be formulated at pH levels less than 3.5 to enter the skin.⁶

- *Is there enough L-ascorbic acid to produce an effect?* A 10 percent to 20 percent concentration of vitamin C is important for maximum effect.

- *Is the preparation stable?* Because L-ascorbic acid is inherently unstable, it's important to choose a product that will retain its efficacy after purchase. Research has shown that anhydrous (water-free) preparations of L-ascorbic acid are far more stable and effective than those containing water.⁹ Laboratory testing, of course, is the best way to determine the stability of a cosmetic preparation.

Vitamin C in its active form, L-ascorbic acid, is extremely effective in preventing skin damage, as well as treating existing damage. Choosing a preparation that is anhydrous, has a low pH and contains a 10 percent to 20 percent concentration ensures maximum efficacy.

Protecting the ECM

The ECM is a complex structure that forms the foundation of the skin. Protecting and supporting it is critical to maintaining skin health, vibrancy and a youthful appearance. ■

For a list of references, go to www.advanceweb.com/healthyaging and click on the references toolbar.

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Disclosure: Dr. Linder indicates that she has an equity position in a health care-related company whose products or category of products are referenced in this article.