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Can antioxidants (whether in supplement or food form) really help create younger-looking skin? Definitely. Free radical damage is one of the principal mechanisms of ageing. And remember, your skin contains a rich reserve of antioxidants, as it's the principal barrier between your body and pollution, cigarette smoke, ultraviolet rays, hazardous chemicals and other sources of free radicals. With age, however, the accumulation of environmental exposure to free radicals, plus the internal oxidation and breakdown of collagen, can cause skin to lose its tone and healthy glow. Internal antioxidants can help create younger-looking skin by reducing inflammation, fending off free radicals, and inhibiting certain enzymes, such as hyaluronidase, which break down collagen.

Vitamin C - the wrinkle-fighting antioxidant

Vitamin C is one of the most important nutrients for protecting and preserving health and beauty. With special help from the bioflavonoids, vitamin C helps build collagen (it's an essential cofactor for the enzymes involved in making collagen), which gives your skin a youthful bounce. Vitamin C is also a spectacular antioxidant. Whenever vitamin C encounters a free radical, it sacrifices one of its own electrons in order to 'pacify' and neutralise the intruder, destroying itself in the process. This running battle between vitamin C and free radicals occurs hundreds of thousands of times per second. Vitamin C helps protect against the oxidative stress that occurs as a result of UV exposure, which can lead to photo ageing of the skin. Compared with healthy skin, photo-aged skin or naturally aged skin contains lower levels of vitamin C.

If you want a gorgeous, radiant complexion, it's time to learn the ABC - and E and OPCs - of antioxidant-based skincare. **Erica Angyal** reports.

**LOOK YOUNGER
FOR LONGER**

Vitamin C not only snags free radicals but recharges levels of vitamin E and glutathione peroxidase, also powerful antioxidants which can help your body fight the effects of pollution, smoking and radiation. Along with playing an important role in preventing ageing and skin wrinkling, easy bruising and broken veins under the skin, this anti-ageing vitamin also helps combat stress and varicose veins.

There is considerable evidence that supplemental vitamin C, plus a diet high in raw fruits and vegetables, helps save skin from premature ageing. But of all the dietary (from food and supplements) vitamin C absorbed by our bodies, only about 8 per cent is taken up by the skin. So you need ample amounts of vitamin C from both your diet and added supplements.

DEFICIENCY SYMPTOMS Easy bruising, bleeding gums when brushing or flossing, premature wrinkling, poor immunity to colds and flu.

RECOMMENDED DAILY BEAUTY DOSAGE 500-2000 mg (Take in divided doses throughout the day). Take vitamin C with bioflavonoids as this increases the absorption of vitamin C by a whopping 35 per cent. The recommended dietary intake (RDI) for vitamin C of 40 mg is not even enough for normal nutritional needs, much less for protection from free-radical damage.

Vitamin E – youth and beauty preserver

This spectacular antioxidant helps to counteract premature ageing by protecting your cellular membranes and other 'oily' structures from damage and genetic mutation. Vitamin E acts as a security guard, ready to pounce on free radicals. As 'oily' molecules are especially susceptible to free radical damage, vitamin E is important in helping protect your skin from environmental damage and other assaults. When free radicals come along, they hitch up to vitamin E, damaging it instead of the rest of the cell membrane. In the process, vitamin E soaks up free radicals and the cell is protected from damage. Also, unless liberally supplied with vitamin E, these membranes can lose flexibility, harden and age. They then stop taking in nutrients and discharging wastes efficiently, which is bad news for skin.

INSIDER TIPS

- Top up on vitamin E and vitamin A when your skin is exposed to the sun.
- If you have high blood pressure or are taking blood thinners (such as the anticoagulant medication Warfarin), consult your doctor before taking vitamin E. Vitamin E is a mild anticoagulant (blood thinner) so you must inform and consult with your health care provider before any surgery.
- If you're deficient in vitamin A, no skin treatment will work properly.
- Take a teaspoon of cold-pressed cod liver oil every day, especially during the winter months - it's a wonderful source of vitamin D.
- It's best to take beta-carotene in the mixed carotenoid form. Studies conducted in the mid-1990s in Finland and the US found that beta-carotene supplements increased lung cancer risk. This study, however, used synthetic beta-carotene.

Humans are among only a handful of species on the planet that can't manufacture their own supplies of vitamin C, so we need to replenish our stores daily.

Vitamin E also oxygenates tissues and increases your body's stores of vitamin A. It can prolong cell life, promote healing and reduce scarring. In addition vitamin E has been shown to improve a variety of skin conditions, including acne, eczema, and psoriasis. Plus, it's a valuable treatment for sunburn. Vitamin C and other antioxidants can regenerate vitamin E. But with a shortage of vitamin E, there's an increase in free radicals, cellular injuries and subsequent disorders to bodily tissues, including accelerated ageing of the skin. Vitamin E works best with selenium and vitamin C.

DEFICIENCY SYMPTOMS Premature ageing, lacklustre skin, lethargy, and muscle wasting.

RECOMMENDED DAILY BEAUTY DOSAGE 400-800 International Units (IU) daily. Beware of dl-alpha-tocopherol - it's a synthetic form of vitamin E and

not well recognised by your body. Look for mixed tocopherols and tocotrienols. Vitamin E is probably the most challenging vitamin to obtain through diet alone because even the richest beauty food sources fall short of the recommended dosage.

Vitamin A – wrinkle fighter extraordinaire

The number one wrinkle fighter, vitamin A is critical for the normal growth, development and renewal of skin cells, keeps skin tissue healthy and is a powerful antioxidant. By nurturing the fat lying beneath the skin, vitamin A helps ensure that skin is taut, silky soft and youthful looking. Vitamin A also makes sure that the skin cells rising to the surface remain supple, so your skin feels soft and smooth. Vitamin A may help prevent skin damage.

DEFICIENCY SYMPTOMS It's time to top up on vitamin A if your skin is dry or rough, or it breaks out in spots. Other signs include dry, fragile skin prone to wrinkles, blackheads, white heads, splitting nails, bumpy and pimply skin.

RECOMMENDED DAILY BEAUTY DOSAGE 10,000-25,000 International Units (IU) or up to 50,000 IU under the supervision of a medical practitioner. If pregnant or trying to become pregnant, keep dosages below 10,000 IU.

Beta-carotene – beauty booster and sun shader

Beta-carotene helps your body generate new cells, including skin cells, and protects against cancer. It also helps

SAVE FACE

Energise and protect your skin with topical antioxidants:

VITAMINS C AND E The healing powers of vitamin C are actually enhanced when it's combined with vitamin E.

COENZYME Q10 Essential for shedding dead skin cells so that newer ones can emerge.

GREEN TEA Contains powerful polyphenols that protect cells from damage and help slow inflammation caused by sun exposure.

prevent dry, rough skin and premature ageing. As an antioxidant its main role is to detoxify a highly energetic free radical called the Singlet oxygen free radical. The Singlet oxygen free radical is produced as a natural by-product of metabolism as well as from exposure to UV rays, and it's particularly reactive and highly destructive to cells. Sunlight-induced Singlet oxygen mutates the DNA in your skin fibroblasts, and accelerates extrinsic ageing. Beta-carotene is one of your best defences against these nasty free radicals. Its potent antioxidant properties also neutralise the very destructive polyunsaturated-fat radical. Plus, it speeds healing and is great for acne.

DEFICIENCY SYMPTOMS Premature wrinkles, acne, pimples, blackheads, psoriasis, vision disorders, respiratory problems, dry, rough, itchy, scaly, cracked skin and slowed healing. An early sign of beta-carotene deficiency is 'chicken skin' – small raised bumps on the back of the neck, upper arms, back and shoulders.

RECOMMENDED DAILY BEAUTY DOSAGE 15-160 mg.

Coenzyme Q10 (CoQ10) – powerful free radical quencher

Technically known as ubiquinone, coenzyme Q10 (CoQ10) is a powerful antioxidant found naturally inside cells. It protects the body from free radical damage and aids in metabolic reactions. It plays an essential role in energy

production, as well as acting as an antioxidant in cell membranes. These membranes function as the doors and walls of cells, letting nutrients in and waste products out.

CoQ10 is necessary for production of adenosine triphosphate (ATP), the 'fuel' of all living cells. The increased energy production facilitated by CoQ10 will benefit your skin as well. With age your body produces less CoQ10, so there is less of its antioxidant power to go around. This is bad news for skin cells

Coenzyme Q10 accelerates the action of your cell's motor – the mitochondria – keeping cells running like well-tuned cars while protecting your motor from destructive free radicals. When the mitochondria runs down, however, the ageing process can run rampant.

because, in theory, low levels of CoQ10 can show up as skin ageing. CoQ10 is sometimes called the 'biomarker of ageing' because its level correlates so well with ageing and degenerative diseases. Excessive exposure to ultraviolet radiation can rapidly deplete levels of CoQ10 in the skin.

DEFICIENCY SYMPTOMS A deficiency of CoQ10 has been associated with a variety of heart problems including arrhythmias, angina and high blood pressure. Gingivitis (inflammation of the gums) and problems in regulating blood sugar have also been linked to a CoQ10 deficiency.



RECOMMENDED DAILY DOSAGE 30-200 mg (take it with food as it's fat soluble).

Alpha lipoic acid – universal antioxidant

According to one of the world's leading authorities on antioxidants, Dr Lester Packer of the University of California in Berkeley: 'Lipoic acid is the most versatile and powerful antioxidant in the entire antioxidant defence network.' Lipoic acid has an unusual relationship with four other important antioxidants: glutathione, coenzyme Q10, vitamin C and vitamin E. Dr Packer's extensive research has shown that together these five compounds form a unique 'antioxidant network': they interact with each other in such a way as to regenerate their antioxidant capacities after they have successfully neutralised free radicals. In other words, they can be used over and over again as antioxidants. Great news for your skin – as without this regenerative process, these molecules (like most other antioxidants) would be lost to metabolic processes once they have reacted with free radicals. Lipoic acid is the linchpin in this process, because it's the only one that can recycle the other four (and the only one that can do this by itself).

Alpha-lipoic acid preserves and boosts the level of antioxidants in the skin, shoring up defences against ageing. Most of the skin benefits are from its free

THE BEST SUN DEFENCE

WHEN IT COMES TO PROTECTING DELICATE FACIAL SKIN, ANTIOXIDANTS ARE AS IMPORTANT AS SUNSCREENS.

Certain carotenoids can act like 'shades' for your skin. Beta-carotene helps protect your skin from the free radicals produced from UV exposure and allows longer exposure to the sun without damage.

The January 2003 issue of the *US Journal of Nutrition* reported that supplemental beta-carotene (along with vitamin E) can reduce susceptibility to sunburn. Vitamin E works synergistically with the carotenoids, boosting their effect. Beta-carotene quenches free radicals, which can promote inflammation and skin cell damage characteristic of

sunburn. This study found that either a natural beta-carotene or mixed-carotenoid supplement (typical of the mix of carotenoids found in fruits and vegetables) provides similar protection against sunburn.

Scientists believe that beta-carotene works by causing slight changes in skin pigmentation and preventing free-radical damage to the skin. If you want the additional protection, vitamin E and carotenoid supplements should be taken over a four- to six-week period before increased sun exposure, as it takes several weeks for these nutrients to build up in the skin.

BEAUTIFYING FATS

If you want to stop fine lines from appearing and to maintain moist, radiant skin, then essential fatty acids are the key. The beneficial effects of EFAs for improving skin are staggering. They have a powerful effect on hormones, improving blood flow, and are strongly anti-inflammatory. They help lubricate the fatty layer just beneath your skin. EFAs are also vital for wound healing, psoriasis and balancing sebum production (EFAs will improve your skin, whether it's oily or dry). When you supplement with the Omega-3s you'll definitely see a change in the texture of your skin, and you'll probably also notice a softening in the lines on your face.

Your skin requires a constant supply of EFAs, but it particularly needs EFAs when stressed by the damage that occurs with sunburn. Experiments have shown that UV rays cause a significant release of fatty acids from the cell membranes. The cells use these fatty acids to regulate the inflammation, swelling and pain. Gamma linolenic acid (GLA), from borage, evening primrose and black currant oils, has been found to reduce redness, swelling and pain from UV damage. Also, as we age, GLA production decreases, and that's one reason we become more susceptible to wrinkles. Babies have higher levels of GLA, which is one of the reasons they have such plump, moist skin. A number of other factors diminish the amount of GLA in your body, including: hydrogenated fats, fried foods, sugar, a sluggish thyroid, and low levels of magnesium, zinc and vitamins C, B3 and B6.

A recommended daily dosage is 1-2 tablespoons of flaxseed oil, 500 mg of GLA, 1000-3000 mg of EPA/DHA (the omega-3 fatty acid found in fish oils).

radical defending action, as well as being strongly anti-inflammatory. Another bonus is that lipoic acid improves insulin resistance and speeds the removal of glucose from your bloodstream. Plus, it helps neutralise and remove toxic metals from the body. It is also an inhibitor of glycation and cross-linking, which are key age accelerators.

Proanthocyanadins – powerful flavonoids

The flavonoids (which also include the polyphenols – think green tea) all have powerful antioxidant properties, but both grapeseed extract and pine bark extract seem to have the best effect on skin and offer greatest protection against premature ageing. They are also great for preserving the youthful resilience and bounce of your skin. Oligomeric proanthocyanadins (OPCs) protect capillary walls and promote normal permeability of capillaries. When circulation is enhanced, your skin cells are better nourished. The removal of toxins and waste products from the dermis and epidermis speeds up, too. The OPCs have also been shown to improve blood and oxygen flow by dilating blood vessels. Poor circulation can lead to water retention, which can cause puffiness around eyelids.

Research has found that the OPCs strongly inhibit several enzymes involved in the degradation of collagen, elastin and hyaluronic acid. Additionally, OPCs protect and strengthen collagen and elastin, and so help prevent premature ageing.

Proanthocyanadins protect against UVB rays. Known as sunburn radiation, UVB light penetrates the epidermis and cripples your skin's natural antioxidant defence system, rendering it powerless against skin-damaging free radicals. Studies have shown that pycnogenol, in particular, reduces skin-cell damage caused by UVB radiation and scavenges the free radicals it generates. Pycnogenol is an anti-inflammatory agent. Whenever you can reduce inflammation in the skin, free radicals stay in check.

RECOMMENDED DAILY BEAUTY DOSAGE 50-150 mg of OPCs daily. For the treatment of varicose veins and swelling following injury, the dosages range from 150 to 300 mg daily.]



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