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REPORT

Cosmetics that Protect and Enhance the Health of the Skin

At an early age, women begin applying makeup to their faces. The cosmetics are usually put on in the morning, re-applied throughout the day, and then taken off only at bedtime. As women grow older, they often saturate their faces with heavier layers of makeup. As a result, most women spend the majority of their lives wearing cosmetics.

This begs the question of whether this constant exposure to cosmetic preparations is healthy for the skin. A look at the ingredients in commercial cosmetic products reveals that they provide little in the way of beneficial effects. It would seem logical that if a woman is going to wear cosmetics to enhance her appearance, the ingredients in those cosmetics should at least help improve the health of her skin.

Sadly, the \$45 billion-a-year cosmetic industry has overlooked the obvious—the desirability of including validated anti-aging ingredients in cosmetic preparations. An ideal cosmetic would incorporate nutrients that have been shown to protect and improve the skin's appearance. This would provide significant benefit to the tens of millions of women who wear makeup every day.

Recognizing the deficiencies in commercial makeup products, the Life Extension Buyers Club has identified a cosmetic company that includes in its products ingredients that protect against age-accelerating environmental factors and provide nutrients that have been shown to partially reverse some aspects of skin aging.

Wrinkles, dryness, sagging, and irregular pigmentation characterize aging skin. Yet scientific studies have identified nutrients that can slow and even partially reverse these unsightly outward effects.¹

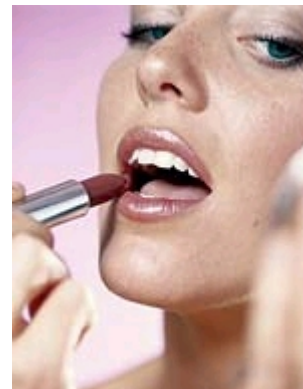
Sun exposure, for instance, is a major cause of skin aging and skin cancer. Photodamage is characterized by the formation of damaging free radicals. Photoradiation depletes the body's natural antioxidant systems and increases the destructive modification of proteins in a process known as glycation. These pathological effects can be seen in the upper and lower layers of the skin.

Glycated proteins result in the stiffening, wrinkling, and unsightly leathery appearance of aging skin.² Collagen degradation induced by ultraviolet light causes a breakdown of the skin's structural support system, resulting in skin sagging, distortion, and excessive wrinkling.

Women concerned about the health of their skin try to avoid prolonged exposure to the sun. The unfortunate fact is that normal, everyday sun exposure causes cumulative damage that results in premature aging. Sun exposure not only accelerates aging, but also increases skin cancer risk. A dermatology researcher described the multiple pathological effects of sunlight and concluded his study by stating:

“ . . . everyday use of products that protect against UV radiation is necessary to prevent acute and long-term photodamage (clinical and cellular changes) leading to photoaging, photoimmunosuppression, and photocarcinogenesis.”³

Considering the deleterious effects that ultraviolet light inflicts on the face, it makes perfect sense to fortify lipsticks and foundations to guard these facial areas against destructive ultraviolet rays. Some women pay dermatologists thousands of dollars for collagen injections in their lips and faces, yet neglect to protect their own precious natural collagen against destructive solar rays. Now there are cosmetic products available that provide sun-blocking agents to guard the lips, cheeks, forehead, nose, and other parts of the face. These new cosmetics also provide nutrients that help rejuvenate collagen.



Applying Green Tea Extract

Many independent studies reveal that the topical application of green tea extract provides broad-spectrum protection against skin aging. These published studies indicate that people can derive significant benefit from green tea extract applied topically on a consistent basis.

In a study published in the prestigious journal *Proceedings of the National Academy of Sciences USA*, hairless mice were irradiated with ultraviolet B (UVB) light twice weekly for 20 weeks.⁴ Their exposure to UVB meant that these mice had a high risk of developing skin cancers. The mice were then treated topically with green tea extract after the UVB exposure (once a day, five days a week, for 18 weeks).

The study results showed that topical applications of green tea extract decreased the number of nonmalignant tumors by 55% and reduced the number of malignant tumors by 65%. Cellular analysis showed that topically applied green tea extract significantly increased apoptosis (cell death) in tumor cells, but did not have an apoptotic effect in healthy cells. Significantly, this study clearly demonstrated that green tea extract can inhibit the development of skin cancer after long-term exposure to UVB light.⁴



Green tea extract possesses antioxidant, anti-inflammatory, and anticarcinogenic properties. Studies of human skin have demonstrated that green tea prevents ultraviolet-induced damage that leads to immune suppression and skin cancer induction. Treating human skin with green tea extract prevents penetration of UVB radiation. Scientists have published research indicating that green tea prevents the DNA skin damage, inflammation, and immune suppression that result from UVB exposure.⁵

ANTIOXIDANTS AND SKIN AGING

Recently published research confirms that a decline in natural antioxidant systems is a key factor responsible for the unsightly appearance of aged skin.

Scientists believe that due to its antimutagenic and antitumor activities, green tea extract is a promising candidate for use in topical formulations for skin cancer prevention.⁶

When skin is exposed to ultraviolet light, inflammation-inducing leukocytes infiltrate the skin, immune cells are depleted, and oxidative damage occurs. A group of scientists pretreated the skin of mice with green tea extract in order to define how this might protect against immune suppression and cancer. Topical green tea application before a single dose of UVB exposure inhibited the expected infiltration of leukocytes into the skin. Green tea also prevented UVB-induced depletion of the number of antigen-presenting cells in the immune system. As far as oxidation is concerned, green tea protected against UVB-induced hydrogen peroxide and nitric oxide free-radical damage in both the epidermis and dermis. The scientists concluded

that green tea might be effective in preventing solar-induced skin cancers and immune suppression.^{7,8}

While the anticancer potential of green tea is well established, the effects of green tea on normal skin aging processes are also of significant interest. Scientists conducted a study investigating the effects of green tea extract on healthy skin cell proliferation and UV-induced cell death. When topically applied to aged human skin, green tea extract stimulated the proliferation of structure-supporting skin cells (keratinocytes), which increased the epidermal thickness of the skin. In addition, this topical application inhibited the UV-induced destruction of keratinocytes. Aging is characterized by thinning skin and destruction of skin cells. This study showed that topical application of green tea extract improved these two molecular parameters of skin aging.⁹

Free radicals cause tremendous damage to the skin and are a major causative factor in skin aging. In a study that measured antioxidant levels in the skin, green tea extract was topically administered to hairless mice that were then exposed to UVB light. The results showed a substantial reduction in the depletion of natural antioxidants normally induced by UVB light. Topical green tea prevented the reduction of glutathione by 87-100%, of glutathione peroxidase by 78-100%, and of catalase by 51-92%. Topical treatment with green tea extract also inhibited oxidative stress when measured in terms of lipid peroxidation (a 76-95% reduction) and protein oxidation (a 67-75% reduction). Molecular measurement of skin-aging damage showed that significant protective effects were conferred by the green tea. The scientists next added green tea extract to the drinking water of these mice and observed similar antioxidant benefits to the skin, though comparatively less than when green tea extract was applied topically.¹⁰

In another study of hairless mice, scientists applied green tea extract before UVB exposure. These treatments were repeated every other day for two weeks, for a total of seven treatments. Topical application of green tea extract significantly decreased UVB-induced bifold-skin thickness, skin edema, and infiltration of leukocytes. Using molecular measuring tests, the scientists determined that green tea suppressed the damaging effects of UVB and the subsequent inflammatory cascade by several well-defined mechanisms.¹¹ This study corroborates other findings indicating that topically applied green tea extract may protect against accelerated skin aging.

Why Skin Cancer Protection Is Critical

Aged skin is more vulnerable to cancer than younger skin. More than 1 million cases of basal cell or squamous cell skin cancers will be diagnosed in the US this year. Many basal and squamous cell carcinomas develop on the face. The most serious form of

skin cancer—malignant melanoma—will be diagnosed in about 55,000 Americans in 2004.

When skin cancer develops, the face can be scarred with long-lasting, unsightly surgical lesions. Exposure to everyday solar rays is the major causative factor for face cancers and skin aging. Taking steps to protect your face every day from destructive UVB rays is mainstream medicine's most highly recommended anti-aging technique.

The antiaging cosmetics that are now available contain extracts from green, white, and red teas, along with potent sun-blocking agents that have high sun-protection-factor (SPF) ratings to protect the lips and facial skin. Preliminary studies of white and red teas indicate that they may possess anti-aging properties even greater than those of green tea.¹²

How Vitamin C May Reverse Skin Aging

It is well established that oral consumption of vitamin C is required for healthy collagen synthesis. A growing body of evidence, however, reveals that the topical application of vitamin C produces much faster and more profound effects in facial skin.



In a double-blind human study, topical vitamin C was applied to one-half of the face and a placebo gel was applied to the other side. Clinical evaluation of wrinkling, pigmentation, inflammation, and hydration was performed prior to the study and at weeks 4, 8, and 12. The results showed a statistically significant improvement of the side treated with vitamin C, with decreased photoaging scores of the cheeks and the periorbital area. The periorbital area improved in both the vitamin C and placebo-gel group, likely indicating improved hydration. The overall facial improvement of the vitamin C side was statistically significant. Biopsies showed increased collagen formation in the vitamin C group. This study showed that topically applied vitamin C results in clinically visible and statistically significant improvement in wrinkling when used for 12 weeks. This clinical improvement correlated with biopsy evidence of new collagen formation.¹³

Human studies have demonstrated pronounced protective effects of antioxidants when applied topically before ultraviolet radiation exposure. With respect to UVB-induced skin damage, the photoprotective effects of antioxidants are significant. Topical application of antioxidant combinations may result in a sustained capacity of the skin to resist damaging free radicals,

possibly due to antioxidant synergisms.

Free radicals are a culprit behind UVA-induced skin alterations, thus providing a scientific basis for topical antioxidant administration. In a human study, topical application of antioxidants resulted in diminished severity of UVA-induced sun damage. Thus, regular application of skin care products containing antioxidants such as vitamins C and E may be of the utmost benefit in protecting skin against the exogenous oxidative stressors encountered in daily life. Sunscreen agents may also benefit from being combined with antioxidants, as both the safety and efficacy of the sun-blocking products are enhanced.¹⁴

Collagen is the chief constituent of the connective tissue that supports the skin's structure. The skin requires constant synthesis of new collagen to remain firm and youthful. Epidemiological studies strongly indicate an association between tobacco smoking and skin aging. One study showed that collagen biosynthesis was reduced by 40% following treatment with tobacco smoke extract. When an antioxidant mixture that included vitamins C and E was applied, the destructive alteration of collagen induced by both tobacco and UVA radiation was prevented.¹⁵

A randomized, double-blind controlled study was conducted on human volunteers to determine the efficacy of topical vitamin C application in treating mild to moderate photodamage of facial skin. Methods of evaluating efficacy included an objective computer-assisted image analysis of skin surface topography, as well as subjective clinical, photographic, and patient self-appraisal questionnaires. Topical vitamin C was applied to one side of each patient's face and a placebo was applied to the other side for three months.

The results using the optical image analysis demonstrated that compared to placebo, the side treated with vitamin C showed a statistically significant 71% combined score improvement. Clinical assessment parameters demonstrated significant improvement with vitamin C treatment compared to placebo for fine wrinkling, tactile roughness, coarse rhytids, skin laxity/tone, sallowness/yellowing, and overall features. Patient questionnaire results demonstrated statistically significant improvement overall, with the vitamin C treatment scoring 84% greater than placebo. Photographic assessment demonstrated significant improvement as well, with the vitamin C treatment scoring 58% greater than placebo. This three-month study using topical vitamin C provided objective and subjective improvement in photodamaged facial skin.¹⁶

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Effects of Combining Vitamins C and E

The combination of antioxidants and sunscreens to provide enhanced protection against UV rays has generated considerable scientific interest. Two of the best-known antioxidants are vitamins C and E. Each has been shown to be effective in different models of photodamage. In a study utilizing swine skin, vitamin C provided additive protection against acute UVB damage (sunburn cell formation) when combined with a UVB-preventive sunscreen. When a combination of vitamins E and C was used, enhanced protection from UVB insult resulted. Vitamin C, however, was significantly better than vitamin E in protecting against UVA-mediated phototoxic damage in this animal model.¹⁸



RESEARCHERS: "EVERYONE" SHOULD APPLY TOPICAL PHOTOPROTECTANTS

A report released by Tulane University's School of Medicine states that "every patient should topically apply photoprotectants in order to prevent photodamage to the skin."¹⁷ This report confirms the critical importance of applying a sunscreen with antioxidants every time you go into the sun.

A study of vitamins C and E in young, aged, and photodamaged human skin sought to ascertain the various levels of these antioxidants in each skin type. The findings showed that the concentration of vitamin E was significantly lower in the epidermis (upper layer) of photoaged skin (56% lower than in young skin) and aged skin (61% lower than in young skin). There was no difference in vitamin E levels in the dermis of each skin type. In photoaged skin, vitamin C levels were 69% lower in the epidermis and 63% lower in the dermis; in naturally aged skin, vitamin C levels were 61% lower in the epidermis and 70% lower in the dermis. Glutathione concentrations were also lower compared to young skin. These results show that the antioxidant defense systems in normal aged and photoaged human skin are significantly diminished compared to that in young skin.¹⁹

Critics used to claim there was no evidence that topically applied products affected skin aging. Many recently published studies have proven the skeptics wrong. The science clearly substantiates that free radicals play an important role in causing skin aging, and that topically applied antioxidants confer significant protection and can even partially reverse some aspects of skin aging. Newly available lipsticks, foundations, and eye preparations contain broad-spectrum antioxidants to provide the skin with all-day protection.

Cell-Renewal Effects of Vitamin A

Vitamin A and its retinoid analogs stimulate skin cell renewal by increasing the rate of mitotic cell division.²⁰⁻²² One mechanism by which vitamin A does this is by acting as a signaling agent to stimulate the binding of epidermal growth factor to skin cells.²¹

One characteristic of sun-damaged skin is the degradation of its supporting structure caused by reduced collagen synthesis. A study of 72 people of various ages sought to determine whether the topical application of natural vitamin A could improve function in both naturally aged, sun-protected skin and photoaged skin. In one of the study groups comprising people aged 80 years and older, topical application of vitamin A for seven days increased fibroblast growth and collagen synthesis, while reducing levels of a collagen-degrading skin enzyme called metalloproteinase. The overall findings indicate that naturally aged, sun-protected skin and photoaged skin share important molecular features, including connective tissue damage, elevated metalloproteinase levels, and reduced collagen production. Topical vitamin A treatment reduced matrix metalloproteinase expression and stimulated collagen synthesis in naturally aged and sun-protected skin, as it does in photoaged skin.²³ Vitamin A drugs (Retin-A®) have shown more profoundly acute effects in reversing aging effects in both photodamaged and naturally aged skin, but some people find them irritating to the skin.²⁴

One of the most disfiguring skin diseases is the appearance of cancer. In a study that sought to compare the effects of dietary administration of a vitamin A drug (13-cis-retinoic acid) to those of the natural form of vitamin A (retinyl palmitate), female mice were administered a chemical carcinogen to evaluate the incidence and severity of mouse skin tumor promotion. The results showed that retinyl palmitate inhibited the number and weight of tumors, whereas 13-cis-retinoic acid decreased the weight, but not the number, of tumors promoted.²⁵

In another study, tumors were chemically induced in a group of Swiss mice over a 23-week period. The topical application of the drug 13-cis-retinoic acid was compared to natural vitamin A (retinyl palmitate). This study showed that both the vitamin A drug and natural vitamin A inhibited the development of skin papillomas and had a marked effect on skin cancers.²⁶ Vitamin A may be one of the vitamins best documented to protect against several types of human cancers. One of its mechanisms is to induce healthy differentiation and apoptosis of aged cells. Vitamin A protects the skin by helping to facilitate cell renewal and possibly by preventing skin cancers.



Studies show that the upper layer of the skin or epidermis can be easily saturated with natural vitamin A by topical application. Besides being a precursor for retinoic acid, vitamin A also has potential as a scavenger of free radicals. Vitamin A absorbs ultraviolet light to help protect the skin's most delicate areas against damaging free radical attack.²⁷ Natural vitamin A thus functions via several pathways to guard against normal and sun-induced skin aging.

The new anti-aging lipsticks and foundations contain a natural form of vitamin A to nourish the skin all day long with this cell-renewing nutrient.

The Need for All-Day Protection

There are literally hundreds of cosmetic brands in today's commercial marketplace. To our surprise, we could find only one company whose cosmetics were fortified with nutrients that published scientific studies have shown to be beneficial to the skin.

Considering that women often apply cosmetics on a daily basis, it makes sense that the cosmetics should include ingredients that block damaging ultraviolet light, guard against free radicals, stop inflammatory processes, replenish collagen, stimulate cellular renewal, and restore the skin's natural antioxidants. Exciting new studies show that certain nutrients, when topically applied, can reverse some aspects of skin aging. With the newly available nutrient-rich cosmetics, women have a convenient way to benefit from scientifically documented skin-restoring agents all day long.

A large percentage of the population is infected with herpes simplex virus 1, which causes cold sores or fever blisters on the lips. Exposure to solar radiation is one cause of cold-sore outbreaks. With the advent of high-SPF lipsticks that contain agents that protect against ultraviolet light, it may be possible to avoid sunlight-induced herpes outbreaks on the lips.

For the past 21 years, most Life Extension members have been using the Rejuvenex® anti-aging cream. A brand-new Rejuvenex® formula is now available that provides even greater percentages of skin-enhancing agents, including a potent dose of green tea extract and other new ingredients.

Even more exciting is that for the first time, women can use everyday cosmetic products that contain the skin-protecting ingredients discussed in this article. These new cosmetics enhance a woman's appearance while allowing her to simultaneously nourish her skin with vitamins A, C, and E, along with green, red, and white tea extracts. These anti-aging cosmetics are also fortified with high-SPF sun-blocking agents to guard the skin and lips against the deleterious effects of ultraviolet A and B light.

For ultimate benefit, the new Rejuvenex® should be worn under all cosmetic preparations. Descriptions of the new Rejuvenex® formula and the new nutrient-enriched cosmetics appear on the following pages.

View more details on TAL•SHI Cosmetics and online ordering information.

References

1. Podda M, Grundmann-Kollmann M. Low molecular weight antioxidants and their role in skin ageing. *Clin Exp Dermatol*. 2001 Oct;26(7):578-82.
2. Sander CS, Chang H, Salzmann S, et al. Photoaging is associated with protein oxidation in human skin in vivo. *J Invest Dermatol*. 2002 Apr;118(4):618-25.
3. Nola I, Kotrulja L. Skin photodamage and lifetime photoprotection. *Acta Dermatovenerol Croat*. 2003;11(1):32-40.
4. Lu YP, Lou YR, Xie JG, et al. Topical applications of caffeine or (-)-epigallocatechin gallate (EGCG) inhibit carcinogenesis and selectively increase apoptosis in UVB- induced skin tumors in mice. *Proc Natl Acad Sci U S A*. 2002 Sep 17;99(19):12455-60.
5. Katiyar SK, Bergamo BM, Vyalil PK, Elmets CA. Green tea polyphenols: DNA photo-damage and photoimmunology. *J Photochem Photobiol B*. 2001 Dec 31;65(2-3):109-14.
6. Proniuk S, Liederer BM, Blanchard J. Preformulation study of epigallocatechin gallate, a promising antioxidant for topical skin cancer prevention. *J Pharm Sci*. 2002 Jan;91(1):111-6.
7. Katiyar SK, Mukhtar H. Green tea polyphenol (-)-epigallocatechin-3-gallate treatment to mouse skin prevents UVB-induced infiltration of leukocytes, depletion of antigen-presenting cells, and oxidative stress. *Leukoc Biol*. 2001 May;69(5):719-26.
8. Katiyar SK, Elmets CA. Green tea polyphenolic antioxidants and skin photoprotection (review). *Int J Oncol*. 2001 Jun;18

9. Chung JH, Han JH, Hwang EJ, et al. Dual mechanisms of green tea extract (EGCG)- induced cell survival in human epidermal keratinocytes. *FASEB J.* 2003 Oct;17(13):1913-5.
10. Vayalil PK, Elmets CA, Katiyar SK. Treatment of green tea polyphenols in hydrophilic cream prevents UVB-induced oxidation of lipids and proteins, depletion of antioxidant enzymes and phosphorylation of MAPK proteins in SKH-1 hairless mouse skin. *Carcinogenesis.* 2003 May;24(5):927-36.
11. Afaq F, Ahmad N, Mukhtar H. Suppression of UVB-induced phosphorylation of mitogen-activated protein kinases and nuclear factor kappa B by green tea polyphenol in SKH-1 hairless mice. *Oncogene.* 2003 Dec 18;22(58):9254-64.
12. Available at: <http://www.hsrmagazine.com/hotnews/31h3016734.html>. Accessed July 28, 2004.
13. Fitzpatrick RE, Rostan EF. Double-blind, half-face study comparing topical vitamin C and vehicle for rejuvenation of photodamage. *Dermatol Surg.* 2002 Mar;28(3):231-6.
14. Dreher F, Maibach H. Protective effects of topical antioxidants in humans. *Curr Probl Dermatol.* 2001;29:157-64.
15. Yin L, Morita A, Tsuji T. Alterations of extracellular matrix induced by tobacco smoke extract. *Arch Dermatol Res.* 2000 Apr;292(4):188-94.
16. Traikovitch SS. Use of topical ascorbic acid and its effects on photodamaged skin topography. *Arch Otolaryngol Head Neck Surg.* 1999 Oct;125(10):1091-8.
17. Flynn TC, Coleman WP. Topical revitalization of body skin. *J Eur Acad Dermatol Venereol.* 2000 Jul;14(4):280-4.
18. Darr D, Dunston S, Faust H, Pinnell S. Effectiveness of antioxidants (vitamin C and E) with and without sunscreens as topical photoprotectants. *Acta Derm Venereol.* 1996 Jul;76(4):264-8.
19. Rhie G, Shin MH, Seo JY, et al. Aging-and photoaging-dependent changes of enzymic and nonenzymic antioxidants in the epidermis and dermis of human skin in vivo. *J Invest Dermatol.* 2001 Nov;117(5):1212-7.
20. Ridge BD, Batt MD, Palmer HE, Jarrett A. The dansyl chloride technique for stratum corneum renewal as an indicator of changes in epidermal mitotic activity following topical treatment. *Br J Dermatol.* 1988 Feb;118(2):167-74.
21. Chapellier B, Mark M, Messaddeq N, et al. Physiological and retinoid-induced proliferations of epidermis basal keratinocytes are differently controlled. *EMBO J.* 2002 Jul 1;21(13):3402-13.
22. Koussoulakos S, Sharma KK, Anton HJ. Effect of vitamin A on wound epidermis during forelimb regeneration in adult newts. *Int J Dev Biol.* 1990 Dec;34(4):433-9.
23. Varani J, Warner RL, Gharaee-Kermani M, et al. Vitamin A antagonizes decreased cell growth and elevated collagen-degrading matrix metalloproteinases and stimulates collagen accumulation in naturally aged human skin. *J Invest Dermatol.* 2000 Mar;114(3):480-6.
24. Varani J, Fisher GJ, Kang S, Voorhees JJ. Molecular mechanisms of intrinsic skin aging and retinoid-induced repair and reversal. *J Investig Dermatol Symp Proc.* 1998 Aug;3(1):57-60.
25. Gensler HL, Watson RR, Moriguchi S, Bowden GT. Effects of dietary retinyl palmitate or 13-cis-retinoic acid on the promotion of tumors in mouse skin. *Cancer Res.* 1987 Feb 15;47(4):967-70.
26. Abdel-Galil AM, Wrba H, El-Mofty MM. Prevention of 3-methylcholanthrene-induced skin tumors in mice by simultaneous application of 13-cis-retinoic acid and retinyl palmitate (vitamin A palmitate). *Exp Pathol.* 1984;25(2):97-102.
27. Sorg O, Tran C, Saurat JH. Cutaneous vitamins A and E in the context of ultraviolet or chemically-induced oxidative stress. *Skin Pharmacol Appl Skin Physiol.* 2001 Nov- Dec;14(6):363-72.

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