

# skin aging-D.A.12.1-39

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## **VARIOUS AGEING FACTOR WHICH SIGNIFICANTLY IMPACTS ON THE SKIN AND ITS CONCLUSION.**

### **ABSTRACT:**

As the average lifespan in developed nations rises, proper aged skin care has become a dermatological concern. The complicated, multifaceted process of skin ageing has a genetically established baseline pace but can also be sped up by socioeconomic, mechanical, or environmental variables. Skin fragility, skin resiliency, danger of toxicological injuries, promotion of the development of different cutaneous illnesses, and aesthetically unfavourable consequences like wrinkles and uneven pigmentation are all increased by the fundamental structural changes that take place with skin ageing. Due to the fact that older patients make up a higher portion of the population, it will be important to pay more attention to the issues with older skin, both aesthetic and non-cosmetic, and to build on the effective treatments already in place to enhance their quality of life. According to certain reports, age and overall inner-health state are reflected in the skin. Science and medicine throughout the world have long found nutrition and how it affects skin to be fascinating topics. In an effort to maintain young skin look, a number of plant extracts, including vitamins, carotenoids, tocopherols, flavonoids, and others, have been widely employed in the skin care business as dietary supplements or topically applied treatments.

**Keywords:** Aging skin; free; radicals; photo-ageing; Collagen; Dermis

### **INTRODUCTION:**

With advancing years, skin has a steady decline in morphology and physiology, which is the first overt sign of ageing. Exogenous ageing (such as through constant exposure to light, pollution, ionising radiation, chemicals, or poisons) and endogenous ageing are two different categories of skin ageing. The latter is mostly related to hereditary factors and changes in the endocrine environment and occurs in nonexposed regions that are not in direct contact with environmental variables like ultraviolet (UV) and infrared irradiation (for example, the inner side of the upper arm). Skin that has aged naturally, as opposed to skin that has been exposed to light, shows how the body is deteriorating (1). Skin ageing is a normal human "ageing mosaic" that manifests throughout time and has various trajectories in various organs, tissues,

and cells. The skin exhibits the earliest overt indications of ageing whereas the ageing of interior organs is hidden from ambient "eyes." Skin ageing is a complicated biologic process that causes changes in each skin layer's structure and physiology over time, as well as changes in the skin's appearance, especially on the light-exposed skin regions (2). With advancing years, skin has a steady decline in morphology and physiology, which is the first overt sign of ageing. Exogenous ageing (such as through constant exposure to light, pollution, ionising radiation, chemicals, or poisons) and endogenous ageing are two different categories of skin ageing. The latter is mostly related to hereditary factors and changes in the endocrine environment and occurs in nonexposed regions that are not in direct contact with environmental variables like ultraviolet (UV) and infrared irradiation (for example, the inner side of the upper arm). Skin that has aged naturally, as opposed to skin that has been exposed to light, shows how the body is deteriorating (1). Skin ageing is a normal human "ageing mosaic" that manifests throughout time and has various trajectories in various organs, tissues, and cells. The skin exhibits the earliest overt indications of ageing whereas the ageing of interior organs is hidden from ambient "eyes." Skin ageing is a complicated biologic process that causes changes in each skin layer's structure and physiology over time, as well as changes in the skin's appearance, especially on the light-exposed skin regions (2). (Fig. 1)



In contrast to thin and atrophic, finely wrinkled, and dry skin in tyrannically aged skin, skin that has been exposed to light usually has a thicker epidermis, mottled discoloration, deep

wrinkles, laxity, dullness, and roughness. The progressive loss of skin elasticity causes sagging to occur. elderly individuals, reduced epidermal turnover and lengthened cell cycles are correlated with delayed wound healing and less efficient desquamation (3). When scheduling cosmetic operations, this knowledge is crucial. Many of these characteristics are the focus of treatments or products that speed up the cell cycle in the hope that better skin appearance and quicker wound healing would result from a higher turnover rate. In recent years, several anti-aging techniques have been created due to the fact that skin health and beauty are major indications of general welfare and how individuals perceive their health. These include preventative measures, cosmetic treatments, topical and systemic medicinal medicines, and invasive procedures (4).

### **Molecular factors in skin ageing:**

Extrinsically aged skin may develop wrinkles due to a high loss of fibrillin-positive structures and a decreased quantity of collagen type VII, which impair the link between the dermis and epidermis. Frequently, solar elastosis is observed in sun-exposed skin that has aged. Greater collagen breakdown by matrix metalloproteinases, serine, and other proteases may be the explanation for the sparse distribution and decreased collagen content in photoaged skin despite the same collagen synthesis (5). Studies have shown that when collagen I is destroyed, the proportion of collagen III to collagen I rises, which explains why collagen in old skin appears uneven and disorderly. It is widely known that the overall collagen composition of the skin's surface decreases by around 1 percent every year. Glycosaminoglycans are an essential component of the dermal skin matrix that aids in water binding. In photoaged skin, aberrant elastotic material may bind glycosaminoglycans, leaving them dysfunctional. While levels of epidermal hyaluronic acid decline dramatically with time, levels of total hyaluronic acid in skin with intrinsic ageing stay steady with time. Gravity, muscle activity, volume loss, decrease and redistribution of superficial and deep fat, and loss of bone skeleton support all contribute to the facial ageing process. When these are coupled, the face sags and its shape and contour shift (6). Asian skin reacts differently to the sun than Caucasian skin. Since Asian skin has a tendency to tan more and burn less than other skin types, prolonged UV exposure tends to worsen pigmentation disorders. In Asians, melasma, freckles, and lentigines, which are phenotypic indicators of ageing skin, are more prevalent than little wrinkles, which are the initial indications of ageing in Caucasians (7).

### **Influence of Diet Deficiencies and Specific Diets on Skin Health:**

One of the most crucial factors influencing the health and condition of the skin is nutrition. The description of the cutaneous symptoms of dietary deficits has contributed to some of our understanding. Kwashiorkor, a severe protein/calorie shortage, was shown to be connected with skin biochemical abnormalities in children in the 1970s, explaining the prevalence of cutaneous lesions associated with this illness. More recently, it has been shown that malnutrition in children is characterised by a decrease in the overall melanin content of scalp hair. Skin alterations seen in anorexia nervosa patients offer as another example of how starvation affects skin health. Whether as a result of malnutrition or other circumstances, vitamin deficiencies are linked to a variety of dermatological changes, such as pellagra, which is the typical sign of niacin insufficiency, or hyperpigmentation, which is linked to B12 deficiency. Additionally, trace elements are necessary for healthy skin, and their deficiency is linked to skin changes (8). Both overeating and undereating can affect skin physiology. Indeed, a considerable increase in trans epidermal water loss is observed in obese individuals, suggesting a change in the way the skin barrier functions. Additionally, obesity may alter collagen metabolism, impact micro and macro circulation alterations, and influence sebum production. Last but not least, a variety of dermatoses, including acrochordons, keratosis pilaris, and acanthosis nigricans, are linked to obesity. The intricate process of wound healing involves interactions between many cell types, cytokines, and the extracellular matrix. While some nutrients (such as vitamins A and C, zinc, glucosamine) may shorten the healing process and enhance wound quality, nutritional shortages might hinder wound healing. A research on male volunteers with acne has lately brought attention to the still-controversial relationship between food and acne. The study found that the overall number of lesions improved more in the reduced glycaemic diet group than in the control group. The rise in the ratio of saturated to monounsaturated fatty acids in skin triglycerides has been found in the same study to be connected with an increase in the number of acne lesions. Atopic dermatitis (AD) is a chronic inflammatory skin condition marked by a compromised skin barrier function coupled with an overproduction of Th2-driven T cells (9).



The development of AD lesions appears to be influenced by food hypersensitivity, and dietary restriction of some foods has been shown to ameliorate illness in youngsters. Additionally, a vegetarian diet's effectiveness as an alternative therapy for the treatment of AD was recently examined. This particular regimen reduced the SCORAD by nearly 50% after two months. The aetiology and pathophysiology of psoriasis, one of the most prevalent chronic skin inflammatory diseases, have both been shown to be significantly influenced by diet. A low-energy diet may play a significant supporting role in the management and treatment of psoriasis. Fasting times and a vegetarian diet may both be advantageous. Arachidonic acid deficiency, which would limit the inflammatory cascade and reduce oxidative stress as a result of caloric restriction, might be the cause of these effects (10). Additionally, there is some data that suggests diet may affect the growth of skin lesions brought on by UV exposure. In fact, a review of epidemiological study findings indicates a link between dietary fat intake and both basal and squamous cell cancer. A few years later, the same researchers showed that diets heavy in meat and fat, particularly in people with a history of skin cancer, significantly increase the risk of squamous cell carcinoma in a cohort of 1,360 individuals. A prospective study's findings in 2009 revealed a modest reduction in actinic keratosis among those who consumed the most

fish oil. Similar to how some nutritional components of the Mediterranean diet may guard against skin melanoma (11).

### **Defining characteristics of aged skin**

The major distinction between extrinsic and intrinsic ageing is that intrinsic ageing may be changed by an individual's volition. There are obvious characteristics of ageing skin, independent of the cause(s). The topography of the epidermis, dermis, and subcutaneous tissue undergoes subtle and pronounced changes as a result of skin ageing.(12).

#### **Epidermis:**

It appears counterintuitive to suggest that age-related changes in the dermis are more evident than those in the epidermis when considering the most visible aspect of skin, but this is the case. However, the epidermis exhibits a number of age-related modifications. Some research support the notion that the epidermis of ageing skin is thinner, whereas others dispute this notion. As is generally assumed, the stratum corneum's thickness is unaffected by ageing. In a study comparing the effects of intrinsic and extrinsic ageing, epidermal thickness was found to be constant across the decades in both sun-exposed and -protected skin, with the thickening found to be greater in sun-exposed skin after histopathological examination of 83 biopsies from sun-exposed and protected skin in healthy volunteers aged 6-84. (13). The spinous layer of a wrinkle is smaller at its base than at its sides, according to another research. This study found that the wrinkle base had less keratohyalin granules than the flanks. It is well-known that the dermal-epidermal junction (DEJ), which connects the epidermis and dermis, alters as people age. For example, ageing epidermis has a DEJ with a proportionally reduced connected surface area. In a study of the skin of the abdomen, it was revealed that the DEJ surface area decreased with age, decreasing from 2.64 mm<sup>2</sup> in patients aged 21 to 40 to 1.90 mm<sup>2</sup> in those aged 61 to 80. It is believed that the decreased nutrition transfer between the dermal and epidermal layers and the skin's increased fragility with age are connected to this decrease in DEJ surface area (11).

#### **Benign neoplasms of the ageing skin:**

The appearance and surface texture of skin can vary substantially as we age, including the development of acrochordons (skin tags), cherry angiomas, seborrheic keratoses, lentigos (sun spots), and sebaceous hyperplasias, among other disorders and cutaneous changes..These benign neoplasms are frequently removed at the request of dermatology and cosmetic surgery

patients. There are several damaging therapy alternatives, including hyfrecator and other laser treatments. (14).

### **Dry skin:**

The elderly usually have dry, scaly skin. This manifestation is partially caused by the deterioration or loss of skin barrier function with ageing. Aged skin has been shown to restore a broken barrier function more slowly, making it more prone to developing dryness. Reduced amounts of epidermal fibronectin and lamellar body lipids are only two of the many factors contributing to this multifactorial process. Trans-epidermal water loss (TEWL), which is enhanced in ageing skin, increases the stratum corneum's susceptibility to drying out in low-humidity environments. Aged skin is frequently characterised by dryness, as well as roughness, wrinkles, skin pallor, laxity, fragility, easy bruising, and benign tumours (1).

### **Melanocytes:**

The number of melanocytes decreases by 8–20% every decade as people become older. Clinically, this decline is seen in elderly individuals as a decline in the number of melanocytic nevi. Because older people have less melanin, which absorbs cancer-causing UV radiation, their skin is less able to defend itself from the sun. Therefore, malignancies brought on by the sun are more likely to affect older persons. This is why sun protection is essential for everyone, especially as we age even though the majority of a person's harmful sun exposure happens during the first two decades of life. For healthy senior adults to start include sunscreen in their skin care routines, it is not "too late" (15).

### **Vasculature:**

Numerous investigations have demonstrated that older skin is mostly avascular. In one study, it was shown that old skin has a 35 percent smaller venous cross-sectional area than youthful skin. The removal of the vertical capillary loops in the papillary dermis makes this loss of the vascular network more obvious. Reduced vascularity is linked to reduced blood flow, impaired food exchange, impeded thermoregulation, lower skin surface temperature, and skin pallor (16).

### **Elastin:**

The appearance and surface texture of skin can vary substantially with age in a number of ways, including the development of acrochordons (skin tags), cherry angiomas, seborrheic keratoses,



lentigos (sun spots), and sebaceous hyperplasias, among other diseases and cutaneous abnormalities

### **Glycosaminoglycans (GAGs):**

GAGs are one of the main components of dermal skin, along with collagen and elastin, and they contribute to the skin's external appearance. The ability of these polysaccharide chains to bind water up to 1000 times their volume makes them crucial molecules. They are composed of disaccharide units coupled to a protein core. Hyaluronic acid (HA), dermatan sulphate (two of the most commonly dispersed GAGs), and chondroitin sulphate are members of the GAG family. These substances make healthy skin plump, smooth, and moisturised, and they are thought to help keep the right balance of salt and water in the body. According to several studies, the quantity of GAGs, notably HA, has been reported to be reduced in skin that has undergone photoaging. However, contradicting information from certain research indicates that the amount of GAGs in ageing skin has not changed. This disparity in results is probably explained by the dual HA synthesis in the epidermis and dermis. The overall HA content in the dermis is steady in skin that ages naturally, whereas epidermal HA declines virtually entirely (19).

### **Dermis:**

In those over the age of 60, skin thickness decreases by around 20%. It has been proven through structural investigation that old dermis is mostly acellular and avascular. Changes in collagen production and the generation of fractured elastic fibres also characterise the normal ageing of the dermis. Additionally photoaged dermis has an abnormal accumulation of elastin-containing material and disorganised collagen fibrils. Since collagen, elastin, and glycosaminoglycans are the three primary structural components of the dermis, the bulk of anti-aging skin research has concentrated on these three substances (13).

### **Decreased cell turnover:**

Additionally, the epidermis undergoes additional important alterations due to age. The epidermal turnover rate falls from 30 percent to 50 percent during the third and eighth decades of life. According to Kligman's research, the stratum corneum transit time in young individuals is 20 days and in the elderly it is at least 30 days. Longer cell cycles are associated with a

slower stratum corneum replacement rate, epidermal atrophy, poor wound healing, and often failed desquamation in the elderly. It has been demonstrated that senior people require twice as much time as younger patients to re-epithelialize following dermabrasion resurfacing procedures (20). A sequence of changes produced by slower cell turnover result in the buildup of corneocytes, which give the skin's surface a rough, lifeless appearance. In response to these events, many cosmetic surgeons utilise medications (e.g., hydroxy acids, retinoids) to speed up the cell cycle because they believe it would improve the appearance of the skin and quicken the healing of wounds following cosmetic procedures (21).

### **Relationship between diet and skin ageing:**

Inner beauty emanates from inside. The relationship between nutrition and skin health, or more specifically, the influence of food on skin ageing, has been a fascinating topic of study for scientists and the general public since ancient times. Skin ageing is comprised of two clinically and physiologically distinct, didactically independent processes. The first form is intrinsic skin ageing, which resembles chronological age and affects the skin similarly to how it affects all other organs. The second kind of skin ageing is extrinsic, which is caused by external and environmental causes, including long-term sun exposure and ultraviolet (UV) radiation, as well as smoking, pollution, lack of sleep, and a poor diet. Prevention is the best and most effective strategy for combating the effects of intrinsic skin ageing (22). The greatest defence against the detrimental effects of free radicals is a well-regulated lifestyle (calorie restriction, self-care, and physical activity) with low stress levels and a balanced nutritional diet that includes foods rich in antioxidants. A range of antioxidants, including carotenoids, tocopherols, and flavonoids, as well as vitamins (A, C, D, and E), essential omega-3 fatty acids, certain proteins, and lactobacilli, can improve the health and appearance of the skin. This study evaluates the "anti-aging" benefits of newly enhanced reactive oxygen species (ROS) signalling in order to reach an appropriate equilibrium. ROS production, such as that which occurs during exercise, has anti-aging and cell-protective properties. In response to ROS activation, the STE-like 20 protein kinase 1 (MST1) and Jun N-terminal kinase (JNK) phosphorylate the fork head box class O transcription factor. This results in the transcription of anti-oxidative enzymes, including superoxide dismutase, catalase, and others, from the cytoplasm to the nucleus. Last but not least, the expressed and upregulated intrinsic anti-oxidative enzyme systems of the cell "do their job" and defend the cell from harmful ROS accumulation. Surprisingly, increasing nuclear FoxO levels inhibits cell growth and induces apoptosis. This investigation seeks to

evaluate the current evidence and shed light on the subject of whether nutrition genuinely affects the rate at which our skin grows (12).



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#### **Prevention of skin aging:**

A healthy and effective skin barrier is a crucial barrier against dryness and penetration by various microorganisms, allergens, irritants, reactive oxygen species, and radiation. It is feasible to specifically change the skin barrier to allow for penetration. As a result, routine skin care can temporarily improve skin regeneration, elasticity, and smoothness, thereby altering the state of the skin. To avoid wrinkles from forming, however, the skin's main structural proteins, collagen and elastin, must be stopped from degrading. Some products do encourage the manufacture of these compounds naturally, with the exception of those that enhance elastin, even if the technology needed to properly de-liver these molecules into the skin has not yet been created. The use of topical or systemic antioxidants to reduce inflammation is another essential method of avoiding wrinkle development. These agents should be used with retinoids and sunscreen to maximise their anti-aging benefits (23).

**Table:1**

<b>Systemic agents</b>	Antioxidants, Hormone replacement therapy, skin augmentation, and contouring
<b>Cosmetology care</b>	Daily skin care, Correct sun protection, Esthetic non-invasive procedures
<b>Topical medical agents</b>	Antioxidants Cell regulators
<b>Preventive medicine</b>	Nutrition, diet restriction, and alimentary supplementation, Physical activity, Control of general health, Smoking, Pollution, Solar UV irradiation. Stress

## **Anti-aging therapies:**

### **Estrogen Replacement Therapy (ERT)**

The development of ERT for menopausal women has made it abundantly evident how endogenous oestrogen has a dramatic impact on the skin. Exogenous oestrogen has shown promise in reversing or preventing numerous intrinsic skin ageing processes when given to postmenopausal women. Women utilising ERT consistently had thicker skin compared to those not using it in clinical trials. Using diagnostic ultrasonography, a cross-sectional study revealed that the usage of ERT restored premenopausal levels of skin thickness. Even while the increase in skin thickness was ascribed to an increase in dermal connective tissue rather than the epidermis, it was demonstrated that topically applied estradiol cream increased epidermal thickness by 23 percent and normalised rete peg patterns. It is believed that the decline in postmenopausal oestrogen levels is the main reason of the reduction in dermal collagen that causes skin atrophy with ageing, as there is a 30% loss of collagen within the first five years following menopause (24). Exogenous oestrogen replacement enhances the collagen composition of the dermis, with improvements as substantial as 6.5 percent, according to a plethora of studies examined by Hall (2004), Brincat (2005), and colleagues. Additionally, studies have revealed that ERT improves skin elasticity and laxity, dramatically reducing wrinkles, at least in women who did not smoke (25).

### **Topical Anti-Aging Treatments:**

Topical medications, which have traditionally included sex hormones, vitamins, and different topically applied skin components, predominate when it comes to therapies that are explicitly aimed at the aesthetic problems of ageing skin. Progesterone and oestrogen both counteract several effects of intrinsic and photoaging when given topically. With notable effectiveness, vitamin C and vitamin A have also been used, particularly its derivative retinal. It has been shown that topical administration of an iso-flavone emulsion generated from soy may both greatly increase the quantity of dermal papillae in ageing skin and reverse the loss of dermal papillae at the dermal-epidermal junction. Niacinamide, a topical vitamin B3 formulation, has shown remarkable effectiveness in clinical trials against a variety of unfavourable effects of skin ageing. In a split-face study, 50 Caucasian females between the ages of 40 and 60 used a moisturiser for 12 weeks with and without the inclusion of 5% niacinamide. Compared to skin treated with moisturiser alone, skin treated with niacinamide significantly improved in terms of fine lines, wrinkles, hyperpigmentation patches, texture, red blotches, and sallowness. A 4-week randomised, blinded, controlled trial found that a face moisturiser combining niacinamide, panthenol, and vitamin E enhanced stratum corneum barrier function, moisturised skin, and reduced the clinical signs and symptoms of rosacea (12).

### **Epidermal Stem Cells:**

Recent study has identified the interfollicular epidermis as the location of epidermal stem cells, the subject of considerable interest in the field of contemporary anti-ageing research. About 0.01 percent of basal epidermal cells are these long-term repopulating cells, which is 100 times less than previously thought (26).

### **Some notable anti-oxidants:**

The variety of naturally occurring compounds that have lately been shown to have anti-oxidant action may hypothetically be the subject of volumes of writing. In other words, a comprehensive examination of green tea, tea tree oil, grape seed extract, vitamins C and E, ferulic acid, etc., would much beyond the scope of this chapter. The following is a synopsis of a few antioxidant chemicals that have lately garnered fame and attention. Coenzyme Q10, commonly known as ubiquinone, is a fat-soluble antioxidant present in all cells and essential for the electron transport chain that generates energy. According to studies, coenzyme Q10 has antiapoptotic effects. In addition, it naturally occurs in foods including spinach, almonds,

salmon, and shellfish. It has been demonstrated that coenzyme Q10 declines with age in both people and animals, similar to the active chemicals in skin care products (24). Even though UV radiation is known to remove vitamins C and E, glutathione, and coenzyme Q10 from the epidermal and dermal layers of the skin, coenzyme Q10 is frequently the first antioxidant to be depleted in the skin. Pycnogenol, a chemical derived from plants that is present in many plant extracts such as pine bark, grapes, and apples, has high amounts of procyanidins, a strong family of molecules that effectively eliminates free radicals. Procyanidins, which are present in foods such as grape seed, grape skin, bilberry, cranberry, blackcurrant, green tea, black tea, blueberry, blackberry, straw-berry, black cherry, red wine, and red cabbage, also possess antioxidant properties. Skh: hr hairless mice pre-treated with 0.05–0.2 percent pycnogenol showed a dose-dependent decrease in the inflammatory sunburn reaction after daily exposures to mildly inflammatory solar-simulated UV radiation (oedema). In another investigation, oral supplementation with pycnogenol appeared to reduce the erythematous effects of UV radiation on the skin in 21 persons (2). During supplementation, the amount of UV light required to produce one minimum erythema dose (MED) rose considerably. In addition to its antioxidant properties, pycnogenol is known to have anti-inflammatory properties, which are believed to be a result of its inhibition of IFN-induced ICAM-1 synthesis (27).

Even though many parts of the public continue to undervalue these tactics, avoiding the sun and using sunscreen are still the cornerstones of anti-aging regimens. According to a recent study that appeared in the Journal of the American Medical Association, daily usage of sunscreen with an SPF of 30 significantly slowed the growth of freckles in kids who were predisposed to getting them by 30 to 40 percent. This study backs up doctors' recommendations to wear sunscreen to prevent the development of these pigmented lesions, which not only make skin seem older but are also associated with an increased risk of melanoma(5) (13).

## Conclusion:

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Skin ageing is a dynamic, multifaceted process that is best explained and comprehended using dichotomous expressions: intrinsic or natural ageing, which is cellularly determined as a function of heredity, is unavoidable, manifests as cutaneous alterations, and is preventable; extrinsic ageing, which also causes cutaneous alterations, is caused by exogenous sources. In other words, intrinsic ageing is a natural consequence of ageing and is unaffected by human behaviour. Extrinsic ageing is mostly caused by excessive sun exposure, although there are more variables as well. Photo-ageing is therefore fundamentally identical to extrinsic ageing,

albeit being a subset of the latter. According to the American Academy of Dermatology, practising dermatologists, and other authorities, there is no such thing as a healthy tan, and some individuals have taken this to heart.. Doctors may be successful in noting the concomitant wrinkles and pigmentary changes associated with photo-ageing as well as the potentially more serious effects of chronic sun exposure since this strategy appeals to a person's strong concern about appearance. Other clinical markers of photo-aging include wrinkles, uneven pigmentation, rough skin, and dry skin. These cutaneous symptoms, particularly if they are frequent or severe, may be signs of skin cancer. In order for patients to realise that photodamage is a skin condition that suggests accelerated ageing, doctors must make sure that they explain it to them. To influence patient behaviour and limit the increase of photodamage, photo-ageing, and photo-induced skin malignancies, a quick explanation of the distinctions between intrinsic and extrinsic ageing and/or an overview of the function of telomeres in cellular ageing and cancer may be effective. The only known defences against photo-ageing, aside from avoiding the sun, are sunscreens that block or reduce the amount of UV rays that reach the skin, retinoids that inhibit collagenase synthesis and promote collagen production, and antioxidants, particularly when combined, that lower and neutralise free radicals. But the link between diet and skin ageing is still a contentious and perplexing one. A practical strategy to boost skin protection from oxidative stress is to complement the endogenous antioxidant system with antioxidants that contain skin-natural compounds.

This should not be confused with continuously eating high amounts of isolated antioxidants. The healthiest and safest technique to maintain a balanced diet and youthful-looking skin may be by eating fruits and vegetables.

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