

REVIEW ON ANTI AGING AND ANTIWRINKLE CREAM

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ABSTRACT:

Aging of the skin is a complicated biological process that is impacted by both external and internal factors. Many anti-aging techniques have been created in recent years because to the belief that one of the primary variables indicating an individual's general "well-being" and perception of "health" is their skin's health and beauty. This article aims to discuss the most significant anti-aging techniques dermatologists currently employ, such as preventive measures, cosmetic techniques, topical and invasive techniques, as well as systemic medicinal medications.

KEYWORDS: Melanin, erythema, skin, skin moisture, sebum.

INTRODUCTION

Skin aging is a part of the natural "aging mosaic" that occurs in humans and takes varied forms throughout time in various organs, tissues, and cells. The skin offers the first visible indications of the passage of time, whereas the aging signals of internal organs are concealed by the ambient "eyes."

Exogenous or extrinsic variables (chronic light exposure, pollution, ionizing radiation, chemicals, toxins) and endogenous or intrinsic factors (genetics, cellular metabolism, hormone and metabolic processes) combine to influence the complicated biological process of skin aging. Collectively, these elements result in cumulative physiological and anatomical changes, as well as gradual modifications to every layer of the skin.

Anti-aging, antioxidants, hormone replacement treatment, laser, peeling, fillers and botulinum toxin in the look of the skin, particularly on sun-exposed areas.^[2-12] A thicker epidermis, mottled coloring, deep wrinkles, laxity, dullness, and roughness are typical characteristics of prematurely photo-aged skin, as opposed to thin and atrophic, finely wrinkled, and dry intrinsically aged skin.^[13-18] Sagging is a result of the skin's elasticity gradually declining.^[19] In elderly people, slower wound healing and less successful desquamation are correlated with slower epidermal turnover rate and longer cell cycle. When scheduling aesthetic procedures, this information is crucial.^[20]

However, a lot of these characteristics are intended to be used with products or processes that quicken the cell cycle, with the idea that a faster turnover rate will yield improvement in skin appearance and healing. The look of the skin will improve and wound healing will happen more quickly with a higher turnover rate.^[21] Wrinkles may result from a substantial loss of fibrillin-positive structures^[22] and a decrease in collagen type VII (Col-7) content, which weakens the connection between the dermis and epidermis of extrinsically aged skin.^[23] Solar elastosis is a characteristic of aging skin exposed to the sun. In spite of the same collagen production, greater collagen degradation by different matrix metalloproteinases, serine, and other proteases may be the cause of the sparse distribution and decreased collagen content in photoaged skin.^[24-28]

It has been demonstrated that an increase in the ratio of Col-3 to Col-1 is largely caused by a major loss of Col-1, which is why older skin has uneven and disorganized collagen.^[29] The total amount of collagen in each skin region.

It is possible that the increased collagen deg surface, which is known to diminish by around 1% annually, is the cause of the sparse distribution and decrease in collagen content in photoaged skin.^[30] One of the main components of the dermal skin matrix that aid in water binding is glycosaminoglycans (GAGs). GAGs may be linked to aberrant elastotic material in photoaged skin, which would prevent them from performing as intended.^[31] In skin that ages naturally, the overall amount of hyaluronic acid (HA) in the dermis stays constant, whereas the amount of HA in the epidermis decreases significantly.^[32]

Collagen, elastin, and glycogen-boosting agents (GAGs) are the three main structural elements of the dermis. These components have been the focus of most anti-aging research and efforts related to skin care, ranging from "wrinkle creams" to other filling agents.^[33]

The appearance of facial aging on its whole is linked to the of the main structural components of the skin, like elastin and collagen, to stop wrinkles from forming. Some products do encourage the natural production of these chemicals, with the exception of elastin-enhancing ones, even if the technology needed to appropriately carry them into the skin has not yet been created. Reducing inflammation with topical or systemic antioxidants is another essential strategy to avoid wrinkle formation; these antioxidants should be used in conjunction with sunscreens and retinoids to maximize their preventive benefits.

ANTIOXIDANTS IN THE SYSTEM AND PHOTOPROTECTION

Extrinsic skin aging, or photoaging, is a symptom of chronic photodamage of the skin. Reactive oxygen species (ROS) produced by UV light and DNA photodamage are the first molecular processes that cause the majority of the common histological and clinical signs of chronic skin photodamage. Bending and pigmentary alterations are thought to be the most

significant cutaneous symptoms of premature photoaging. Avoiding the sun, using sunscreens to protect against UV rays, retinoids to inhibit the synthesis of collagenase and increase the production of collagen, and using antioxidants, especially in combination, to lower and neutralize free radicals (FR) are some of the strategies used to prevent photoaging.

Pharmacological Topical Agents with Anti-Aging Characteristics

Antioxidants and cell regulators are the two main categories of substances that can be included in anti-aging creams. By lowering the amount of FR in the tissues, antioxidants such as vitamins, polyphenols, and flavonoids slow down the deterioration of collagen. Growth factors (GF), retinols, and peptides are examples of cell regulators that directly affect and alter the synthesis of collagen and collagen metabolism.

The most significant antioxidants are vitamins C, B3, and E because of their small molecular weight, which allows them to permeate the skin. It has been demonstrated that water-soluble, heat-labile local L-ascorbic acid (vitamin C) at concentrations of 5–15% has an anti-aging effect on the skin by promoting the production of Col-1 and Col-3, as well as collagen-producing enzymes and matrix metalloproteinase (MMP) 1 (collagenase 1) inhibitors. Clinical research has demonstrated that the combination of vitamins C and E provides greater antioxidant protection than either vitamin taken alone.^[33] Vitamin B3, niacinamide, controls cell metabolism and regeneration and is utilized as an anti-aging treatment at a concentration of 5%. According to certain research, after three months of topical therapy, elasticity, erythema, and pigmentations have been noted. When added to skin products, vitamin E (α -tocopherol) exhibits anti-inflammatory and antiproliferative properties at doses ranging from 2 to 20%. It works by making the skin smoother and enhancing the stratum corneum's capacity to retain humidity, speed up the process of epithelialization, and support skin photoprotection. The benefits are not as great as those of vitamins B3 and C.³⁸ In the near future,

Invasive techniques

Numerous in-office techniques exist, the majority of which aim to "resurface" the epidermis by removing damaged tissue and replacing it with reformed skin layers. Occasionally, these procedures also stimulate the production of new collagen. It's probable that telomerase, cytokines, and growth factors will all eventually have their effects harnessed through innovation and technological improvement in the rapidly developing disciplines of gene therapy and tissue engineering.

Chemical Peels

Chemical peels are procedures used to chemically ablate certain skin layers, resulting in tighter, more even skin as a consequence of the skin's repairing and regenerating systems following inflammation of the dermis and epidermis. Three types exist for chemical peels.^[33] Deep peels (TCA > 50%, phenol) enter the lower reticular dermis, while medium-depth peels (TCA above 30 to 50%) reach the upper reticular dermis and superficial peels (α - β -, lipo-hydroxy acids (HA), trichloroacetic acid (TCA) 10–30%) exfoliate epidermal layers without reaching beyond the basal layer. Peeling depth is influenced by the material's concentration and pH in addition to the substance itself, of the remedy and the application's timing.



Figure 1: 45-y-old female with signs of photoaged skin: dyschromia of the skin, multiple lentigines before skin antiaging skin tretment .



Figure 2: 45-y-old female with signs reduced signs of photoaged skin after one treatment with IPL with 550 nm cut-off filter.

IPL, lasers, and radiofrequency (RF) devices for skin resurfacing, tightening, and rejuvenation

- IPL: Uses a bright light to target elastin and improve skin tone by reducing redness and sunspots. It can also help with hyperpigmentation, rosacea, and inflammation.

- RF: Uses controlled heat to stimulate collagen production and tighten skin. RF devices can be monopolar, bipolar, or fractional:
 - Monopolar: Uses a single electrode to heat the skin
 - Bipolar: Uses two electrodes on a handpiece to deliver current to the skin
 - Fractional: Uses microneedles to create controlled injuries and stimulate collagen production
- Lasers: Can be used to slow or reverse signs of aging.

"Subsurfacing," also known as nonablative skin rejuvenation, is a low-risk, quick recovery technique that can repair structural aging changes in the skin without compromising cutaneous integrity.⁷⁷The proposed mechanism of action involves the selective denaturalization of cutaneous collagen caused by heat, which in turn triggers reactive synthesis. Since rejuvenation is a controlled type of skin injuring intended to achieve a more youthful appearance once the wound heals, the term "nonablative skin rejuvenation" is imprecise.

Treatment options for photoaged skin include improving the dermal and subcutaneous layers as well as treating ectatic vessels, erythema, uneven pigmentation, and pilosebaceous alterations (Type I) ageing (Type II).Two main processes can be used to selectively damage the epidermis and superficial dermis: (a) using mid-infrared (IR) lasers to target discrete chromophores in the dermis or at the dermal-epidermal junction, or (b) using other methods



Figure 3: (A) before laser treatment

(B) After laser treatment

Histological slices of skin taken both before and after treatment with the various IPL devices have demonstrated the production of new collagen in the reticular and papillary dermis in addition to an increase in fibroblasts and a corresponding decrease in solar elastosis. In the event that vascular and/or pigment abnormalities improve right away, the collagen remodeling reaction

Skin Rejuvenation Injectables and Dermal Fillers

Increased fibroblast biosynthetic capacity leads to the restoration of an ideal physiological environment, increased cell activity, improved hydration, and the synthesis of collagen, elastin, and HA (hyaluronic acid). This is the aim of skin biorejuvenation. Microinjections of single-active-ingredient products or combinations of highly absorbable and biocompatible substances, such as GF, amino acids, autologous cultured fibroblasts, vitamins, minerals, nutrients, and homeopathic remedies, could produce the intended results in the superficial

dermis.¹¹⁶In vitro, the different formulations can cause fibroblasts to undergo remarkably different molecular and cellular processes.

To clarify whether and how the cellular and molecular processes are involved in facial skin renewal in people, further thorough research is necessary.

Whether these procedures are as effective in vivo, regardless of the patients' ages. Additionally absent is the proof of concept, which includes long-term efficiency and ideal injection techniques.

Fillers are substances that are injected under or within the skin to enhance its appearance through soft tissue augmentation. In addition to synthetic or pseudo-synthetic implants (silicone, polymethacrylate microspheres, poly-L-lactic acid, calcium hydroxylapatite microspheres suspended in aqueous polysaccharide gel, alkyl-imide gel polymer), there are autologous (fat, cultured human fibroblasts), collagen (bovine-derived, human-derived from tissue culture), and HA (nonanimal stabilized or viscoelastic HA from bacterial fermentation). These can be divided into three categories: semipermanent (lasting 1-2 years), permanent (lasting more than 2 years), and temporary materials

Platelet-rich plasma (PRP) that is autologous

The use of autologous platelet-rich plasma (PRP) for skin rejuvenation has gained popularity. Fresh whole blood, which has a high concentration of platelets, is used to make PRP.¹⁶⁰ The α -granules of concentrated platelets activated by aggregation inducers secrete several growth factors (GF), such as insulin-like growth factor (IGF), transforming growth factor (TGF), vascular endothelial growth factor (VEGF), and platelet-derived growth factor (PDGF).¹⁶¹ By binding to particular cell surface receptors, these factors are known to influence activities such as cell migration, adhesion, proliferation, and differentiation. They also encourage the buildup of extracellular matrix (ECM).^[43] Research indicates that platelet-rich plasma (PRP) can stimulate the activation of fibroblasts, which in turn can induce the manufacture of collagen and other matrix components, thereby renewing the skin. The molecular pathways behind PRP-induced wound healing processes, however, remain still unknown and experimental studies confirming the effects of PRP on aged fibroblasts are very limited.

Botulinum toxin (BTX)

Botulinum toxin cannot stop the aging process of the skin and has no effect on the texture of the skin. However, by managing some dynamic facial lines and wrinkles, regular BTX injections can assist to slow down the obvious aging process.



Figure 4: Patient showing glabellar and crow's feet wrinkles. (A) pre-injection, (B) after injection with botulinum toxin.

The underlying cause of crow feet, glabellar lines, and accentuated frown lines—excessive nerve stimulation—is not addressed by the current therapeutic options, which include surgery and implants. Because of its mode of action, BTX is a perfect agent to focus on the primary cause of these dynamic lines:

CONCLUSION

While natural aging is determined genetically and extrinsic aging can also be prevented. Aesthetic dermatology playing a significant part in prevention, regeneration, and delaying of skin aging and also should contribute to “healthy aging” not only in cosmetic means by trying to erase time vestiges in skin with combining knowledge of possible local and systemic therapy, instrumental devices and invasive procedures, filling the lack of scientific investigations and becoming one of the important focuses of the aging research.

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