

Antiaging therapies

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As more and more baby boomers are entering middle age, the demand for antiaging therapy is booming. Influenced by media publicity coupled with advances in medical technology to restore a youthful appearance, there has been an enormous increase in the supply and demand for aesthetic medicine. Many patients want their skin to be restored to a more youthful appearance as greater physical attractiveness can have psychological benefits affecting a person's social interactions, job status, personal image and may even indirectly affect long-term health and longevity.^[1] Today, aesthetic physicians have a much larger armamentarium of materials and techniques with which they can stall the telltale signs of the aging face.^[2] It is equally important for the aesthetic physician to make the right choice of treatment for each of their demanding patients to get the right results. Treatment of an aging face represents a true shift from dealing with 'disease dermatology' to 'desire dermatology.'

The aging face is affected both by intrinsic as well as extrinsic aging. Intrinsic aging is genetically driven and out of one's control, whereas extrinsic aging is affected by sun exposure, environmental insults, stress, sleep patterns, smoking and more. Most of the available treatments target the extrinsic aging, i.e., photoaging.

PRIMARY GOALS

The primary goal of any antiaging therapy is to achieve

a smooth, tight, blemish-free translucent skin, with even plane topography and more highlight than shadows.

ANTIAGING THERAPIES

Antiaging therapies can be grouped under the following headings:

- Cosmetological care
- Topical agents
- Systemic agents
- Procedures

Cosmetological care

Excellent sun-protection is essential to avoid photodamage. Proper selection and usage of both UVA and UVB protective sunscreens is advised as ultraviolet irradiation reduces production of type I procollagen, the major structural protein in human skin.^[3]

Daily skin care routine should include avoidance of hot, frequent and prolonged baths and avoidance of detergent soaps and foams, which could actually lead to dryness of the skin. Use of moisturizers is believed to be a key to fountain of youth, although there is disagreement in the literature about the long-term effects of moisturizing the skin.^[3]

In over-the-counter cosmeceuticals, known as antiaging bioactivators, various ingredients are available that are claimed to be therapeutic e.g.,

How to cite this article: Vedamurthy M. Antiaging therapies. *Indian J Dermatol Venereol Leprol* 2006;72:183-6.

Received: February, 2006. **Accepted:** March, 2006. **Source of Support:** Nil. **Conflict of interest:** None declared.

estrogen creams to slow cutaneous atrophy and collagen loss; creams containing collagen, elastin and essential fatty acids, which are supposed to improve the hydrating properties. But, none of these ingredients have been unequivocally proved to do so in good scientific studies.

Topical agents

Topical treatments have a major advantage of being noninvasive but have a long latency period of 3-6 months before any visible change can be observed; they require perpetual maintenance and can cause contact irritancy or allergy and are expensive.

Tretinoin: Scientific evidence that retinoids can reverse some of the elements of cutaneous aging has been accumulated over time.^[4] All-trans retinoic acid produces improvement of wrinkles by inducing synthesis of collagen I within the papillary dermis^[5] and decreases abnormal elastin and melanin. Only tretinoin and tazarotene have been FDA-approved antiaging agents. To avoid 'retinoid dermatitis,' the recommendation is to start with the mild formulation of 0.25% every other day or twice weekly. With regular use, patients will be able to tolerate increased frequency of application and stronger preparations over time. Both extrinsic and intrinsic aging respond favorably to exogenously applied retinoids.

Vitamin C: Topical use of vitamin C heralded the entry of the antioxidants into skin care. Besides antioxidant property, vitamin C has shown to stimulate both type I and type III collagen synthesis.^[6] Although many topical preparations containing vitamin C are available, most of them have problems with stability and their utility is questionable.

Other antiaging topicals: N-furfuryladenine 0.1% is a plant cytokinin (plant growth hormone) with antioxidant properties. Chlorella is an aquatic plant extract that alters the vascular endothelial growth factor/thrombospondin 1 balance in the skin to exert its antiaging effect. Copper peptide complex is used in the prevention and reversal of photoaging. It helps in the induction of procollagen synthesis.

Alpha hydroxy acids (AHA): Topical application of AHA in photodamaged skin has shown clinical improvements in wrinkling, roughness and dyspigmentation within months of daily application.

Systemic agents

The free radical theory of aging proposed in 1956^[7] is one of the most widely accepted theories to explain the cause of aging. Although antioxidants appear in vegetables and other foods, many believe that higher levels can be achieved by supplementation. Consequently, the use of products touting antioxidants as protective agents in oral supplements is extremely popular. Many antioxidants work synergistically to regenerate and enhance the power of each other (network antioxidants).^[8] These include vitamins C and E, glutathione, alpha lipoic acid, coenzyme Q 10 (CoQ 10), green tea (polyphenols), melatonin and selenium.

Hormones: Estradiol and testosterone implantation in postmenopausal women is supposed to retard collagen loss.^[9] Dunn *et al.* have shown significant improvement in dry skin and skin wrinkling with estrogen replacement.

Procedures

Procedures refer to office-based treatments that may be either physician-performed or device-driven procedures such as laser treatments.

Microdermabrasion: It is a simple and safe procedure in which the skin surface is abraded with rough aluminum oxide or sodium chloride crystals. It is comparable to results achieved with glycolic acid peels.^[10] The principle involved in microdermabrasion is superficial trauma, which damages the skin barrier which repairs within 24 h and also stimulates the fibroblasts to produce collagen. It is believed that 15 μm of skin is removed with each pass.^[11] Weekly treatment has the greatest effect in improving fine lines, texture, pore size and fine acne scars that are more evident in fairer female skin types than thicker skin or male skin. It carries a low risk of adverse effects, which include bleeding, infection and

hyperpigmentation.^[12]

Endermologie: Endermologie is a noninvasive mechanical body-contouring used in the treatment of cellulites. Here the cellulite-affected skin is sucked between the rollers and kneaded for approximately 34-45 min. This temporarily reduces the appearance of the cellulite and the benefits seen, if any, are short lived.^[13]

Chemical peels: Chemical peels are used to treat facial concerns with aging such as rhytides, dyschromias and keratoses. Fortunately dark-skin individuals have fewer wrinkles and wrinkles appear at an older age. Hence the superficial peels may be helpful when combined with sun protection. Superficial peels can also result in residual temporary post-inflammatory hyperpigmentation, whereas the deeper peels produce an initial hyperpigmentation followed by hypopigmentation.^[14] Use of chemical peels to treat the aging face is well established and poses minimal risk in experienced hands.

Botulinum toxin: The most exciting breakthrough in antiaging therapy today is botulinum toxin injections.^[15] Areas targeted include forehead, glabellar region and crow's feet. The only limiting factor is the cost of treatment. The goal of treatment should only be softening of facial lines, not paralysis. It is truly a 'facelift in a jar' and is clearly one of the main breakthroughs in antiaging therapy.

Soft tissue augmentation: There has been a renaissance of interest in soft tissue augmentation as more and more patients seek aesthetic improvement without major downtime or surgical intervention.^[16] While botulinum toxin eliminates only dynamic wrinkles, fillers are the choice for static wrinkles. With a wide variety of filler materials available for the practitioner's use, it has been helpful to improve facial contours, ameliorate wrinkles and stall the telltale signs of the aging face.

Lasers: Cutaneous resurfacing can be broadly divided into ablative skin resurfacing (ASR), which can be accomplished by the use of pulsed carbon dioxide

and erbium:YAG; or non-ablative dermal remodeling (NDR), which can be achieved by non-ablative neodymium: YAG system, radiofrequency, intense pulsed light, fractional photo-thermolysis or light emitting diode photomodulation.

- a) **Non-ablative radiofrequency:** Radiofrequency is a non-ablative tissue tightening procedure cleared by FDA for the noninvasive treatment of periorbital wrinkles and rhytides.^[17] The mechanism is twofold: immediate contraction of existing collagen fibrils and a delayed wound healing response resulting in neocollagen production by stimulated fibroblasts.^[18] The advantage is that it can treat all skin types, but the disadvantage is the cost and need for annual maintenance treatments. Transient skin numbness and subcutaneous fat atrophy are some of the adverse side effects.^[19] Recently, radiofrequency and diode laser have been combined for more efficacy with less side effects.^[20]
- b) **Intense pulsed light:** This is a nonlaser light source used in skin rejuvenation,^[21] suitable for all skin types. In practice, multiple IPL treatment sessions are often required and because of the complexity of selecting the appropriate wavelength cutoff filter, fluence and pulse duration, there is a risk of developing side effects secondary to nonspecific thermal damage like crusting, pigmentary changes and paradoxical increases in hair growth.^[22]
- c) **Fractional photothermolysis (Fraxel®):** A new concept of skin rejuvenation called fractional photothermolysis creates microscopic thermal wounds, sparing the tissue surrounding each wound.^[23] Here there is controlled dermal heating without dermal damage. Following treatment, the skin surface temperatures are elevated by an average of 1-2°C; and the skin has a slight bronzing, which disappears by desquamation within 2 weeks. Fractional resurfacing has also proved to be an effective and safe treatment for lightening of epidermal and dermal pigmentation of melasma.^[24]
- d) **LED photomodulation:** A photo-rejuvenation effect using nonthermal stimulation of cells requiring low energy, narrowband light with specific pulse sequence and duration is termed photomodulation, which is one of the recent

concepts in acquiring smoother appearance of the epidermis. Here the principle is stimulating very superficial collagen in a nonthermal way. Here light is delivered through light emitting diode (LED) to activate fibroblasts causing them to produce collagen and elastin.^[25] This technique is a safe and effective nonpainful non-ablative modality for improvement of photoaging and can be used in all Fitzpatrick skin types without any adverse effect.^[26]

Based on the study performed by the American Society for Dermatologic Surgery in 1999, it was found that majority of women agreed in the adage 'you look as good as you feel.' The Indian women are no different, except that the cost of procedures to look good is prohibitive. Most of the device-driven procedures are expensive and hence simple office-based procedures like chemical peels, microdermabrasion, fillers and botulinum toxin would continue to be the mainstay of antiaging therapies in India. However, advancements in dermatology and explosion of technology will hopefully continue to make antiaging therapies affordable and acceptable to more individuals in future.

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