Skin Rejuvenation: Are Advanced Dermatologic Techniques Enough?

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Human aging and longevity has become a very hot research topic in the last years because of the so-called demographic revolution, which led to a remarkable increase in the number of 65-to-80 years individuals living in Western countries but also in some emerging countries such as China and India.

Longevity can be achieved by different combinations of genetics, epigenetics, environment and stochasticity. The aging phenotype, is very heterogeneous even if specific environmental pressures are known to induce peculiarly selective alterations in different racial groups. It is emerging that the multi-factorial process of aging does not occur harmoniously at organism level, but acts differently in each organ system, organ, tissue and even in each single cell of the body, determining a different aging rate for each of them, in an extremely complex, highly dynamic “aging mosaic” whose final phenotype is not easily predictable. Mosaic-dependent aging phenotype can be influenced by different form of “stressors” to which the body is called to activate adaptive responses. Repeated low grade perturbations are able to improve biological resistance according to an hormetic type of response, while acute, intense exposures lead to reduced cell survival.

Females age differently than males due to the relative hypo-estrogenism related to menopause: a situation that exacerbates the deleterious effects of both intrinsic and environmental aging. Studies have confirmed an average linear decline of 2.1% of skin collagen and 1.13% skin thickness per year during the initial 15–18 postmenopausal years. Postmenopausal women had decreased amount of types I and III collagen as well as a decreased type III/I ratio in comparison with premenopausal subjects. The skin is an estrogen-responsive tissue and interacts with estrogens via specific receptors. Skin aging signs are perceived differently by observers belonging to different age groups, but irregular pigmentation, peri-oral and peri-ocular wrinkles, and loss of lip and cheek volume are considered quite unanimously as age markings. In any case the skin is at the forefront of environmental “challenges” particularly considering light-tissue interaction, mechanical, chemical, and thermal effects. It is a fantastic defensive barrier which needs to be properly protected in order to function well. Anti-aging strategies can be divided into three main categories: preventive; corrective; and long-term functional maintenance. Each category is inevitably dealing with three main levels of intervention: Epidermal, Dermal, and Subcutaneous layers. Prevention, as always, is better than cure and this applies extremely well to the skin.

Advanced sun-protection, topical antioxidants, retinoids, moisturizers and avoidance of potentially harmful habits such as smoking are the mainstay of preventive strategies which, according to a holistic approach, should be associated to a balanced diet and regular physical exercise. Corrective strategies can be divided into three sub-categories: early; advanced; and late. Dermatologists can use a consistent variety of procedures and technologies aiming at simultaneously or sequentially improving all three major skin layers. From microdermabrasion to chemical peels; from cryotherapy to dermabrasion; from lasers and intense pulsed light to radiofrequency; from botulinum toxin to nonanimal stabilized hyaluronic acid fillers; from LED photobiomodulation to high intensity focused ultrasound (HIFU), just to mention the most popular ones.

Usually the earlier dermatologic procedures are performed the better for skin rejuvenation since the number of adult stem cells and the overall functional metabolism of the skin – including proteasome and heat-shock proteins - are at their best. Even if skin aging signs are usually peculiar to most individuals and involve more specifically
Isolated skin layers, combined approaches addressing the whole skin, bear the best results since most of the improvement depends on stimulating highly controlled wound-healing responses where recently keratinocytes have been discovered paying an important role aside fibroblasts. Controlled temperature and micro-epidermal wounding have shown to be among the best combinations.

Multiple technologies and procedures can be effectively performed during the same session activating positive synergistic biological responses within treated tissues as already confirmed by the literature. Innovative combination strategies including anti-aging PDT and laser/energy-assisted trans-epidermal drug/active delivery will potentially open new horizons in the field of skin rejuvenation.

Functional maintenance should be planned at regular intervals in order to keep the improvements achieved by corrective dermatologic procedures as long as possible with the final goal of producing what I like to call “elegant aging”: Not too much, not too little, just enough to keep a good physical and psychological balance though time. “Heroic” defence of a youthful appearance should be avoided when proper physical and psychological balance cannot be achieved.

Modern Dermatology is asked more and more to provide the best anti-aging counselling and treatments to a growing population of aging people. Keeping abreast with the latest technologic advances as well as with the ever growing literature dealing with aging and anti-aging strategies is just a part of the extremely challenging skin rejuvenation arena. Studying and recognizing abnormal psychologic aspects of aging is of fundamental importance to be able to help patients to understand their personal limits beyond which rejuvenation is not “elegant” any more.

In summary skin rejuvenation is a “hot spot” in Dermatology and will be so for many years to come. Skin rejuvenation is inevitably linked to the extremely complex world of anti-aging and should be properly “tailored” to each patient according to a highly personalized approach. Advanced techniques and technologies, even if quite successful, are not enough to produce durable, balanced, functional improvements if not associated with a virtuous life style where diet, exercise, sun protection are properly implemented.
Huidvergrijzing in Rotterdam

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Veroudering van het menselijk lichaam is een bekend fenomeen, wat gepaard gaat met onherstelbaar functioneervlak. Bij de huid staan echter vooral ook uiterlijke veranderingen op de voorgrond. Onder invloed van vrije radicalen en matrixmetalloproteïnessen vindt er afbraak van collageen en elastine plaats, met onder andere rimpels tot gevolg. Veroudering van de huid is echter niet onder één noemer te vatten, maar is grofweg onder te verdeelen in vier subtypes: rimpels, pigmentvlekken, teleangiëctasieën en verzakking met volumeverlies van de huid. Elk subtype vertoont een continuerende proces, beïnvloed door zowel intrinsieke als extrinsieke factoren. Intrinsieke veroudering wordt gedreven door genetische factoren, echter welke genen precies verantwoordelijk zijn, is tot op heden onbekend. Bekende extrinsieke factoren zijn UV-blootstelling en roken, maar er zijn niet veel grote epidemiologische studies omtrek de verschillende kenmerken van huidveroudering. Tevens hebben eerdere studies met name categorische fotonumerieke schalen gebruikt als maat voor veroudering. Aangezien veroudering een continu proces is, lijkt het gebruik van een continue uitkomstmaat beter geschikt. De dermatologische data inclusief digitale foto’s van deelnemers van de Rotterdam Studie bieden mogelijkheden om omgevings- en genetische factoren te onderzoeken in een grote populatie.

METHODEN

Studiepopulatie

Kenmerken van huidveroudering
Voor elke deelnemer werden gestandaardiseerde gezichtsfoto’s met hoge resolutie vervaardigd in het onderzoekscenrum. Speciale software berekende de oppervlakte van rimpels, pigmentvlekken en teleangiëctasieën, uitgedrukt in een percentage van de