



aesthetic medicine

**Official Journal of the International
Union of Aesthetic Medicine – UIME**



Official UIME English Language Journal of:

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- Materials and methods described in details, in order to let the readers reproduce the results.
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| Journal article – in print – more than 6 authors | Fukushima H, Cureoglu S, Schachern P, et al. Cochlear changes in patients with type 1 diabetes mellitus. <i>Otolaryngol Head Neck Surg.</i> 2005; 133: 100-6. |
| Journal article – online *if there is no DOI, provide the URL for the specific article | Coppinger T, Jeanes YM, Hardwick J, Reeves S. Body mass, frequency of eating and breakfast consumption in 9-13-year-olds. <i>J Hum Nutr Diet.</i> 2012; 25(1): 43-49. doi: 10.1111/j.1365-277X.2011.01184.x |
| Journal article – online from a library database* *there is no specific way to cite articles found in library databases according to the AMA so double check with your professor | Calhoun D, Trimarco T, Meek R, Locasto D. Distinguishing diabetes: Differentiate between type 1 & type 2 DM. <i>JEMS [serial online]</i> . November 2011; 36(11):32-48. Available from: CINAHL Plus with Full Text, Ipswich, MA. Accessed February 2, 2012. |
| Newspaper article – in print *if the city name is not part of the newspaper name, it may be added to the official name for clarity * if an article jumps from one page to a later page write the page numbers like D1, D5 | Wolf W. State’s mail-order drug plan launched. <i>Minneapolis Star Tribune.</i> May 14, 2004:1B. |
| Newspaper article – online | Pollack A. FDA approves new cystic fibrosis drug. <i>New York Times.</i> January 31, 2012. http://www.nytimes.com/2012/02/01/business/fda-approves-cystic-fibrosis-drug.html?ref=health . Accessed February 1, 2012. |
| Websites | Outbreak notice: Cholera in Haiti. Centers for Disease Control and Prevention Web site. http://wwwnc.cdc.gov/travel/notices/outbreak-notice/haiti-cholera.htm Published October 22, 2010. Updated January 9, 2012. Accessed February 1, 2012. |
| Entire book – in print | Modlin J, Jenkins P. <i>Decision Analysis in Planning for a Polio Outbreak in the United States.</i> San Francisco, CA: Pediatric Academic Societies; 2004. |
| Book chapter – in print | Solensky R. Drug allergy: desensitization and treatment of reactions to antibiotics and aspirin. In: Lockey P, ed. <i>Allergens and Allergen Immunotherapy.</i> 3 rd ed. New York, NY: Marcel Dekker; 2004:585-606. |

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| | |
|---|---|
| Example Article | |
| <p>1. Zoellner J, Krzeski E, Harden S, Cook E, Allen K, Estabrooks PA. Qualitative application of the theory of planned behavior to understand beverage consumption behaviors among adults. <i>J Acad Nutr Diet</i>. 2012;112(11):1774-1784. doi: 10.1016/j.jand.2012.06.368.</p> | |
| In-Text Citation Example | <p>LARGE INCREASES IN AMERICANS' CONSUMPTION OF sugar-sweetened beverages (SSB) have been a topic of concern. Between 1977 and 2002, the intake of "caloric" beverages doubled in the United States, with most recent data showing that children and adults in the United States consume about 172 and 175 kcal daily, respectively, from SSB.¹ It is estimated that SSB account for about 10% of total energy intake in adults.^{2,3} High intake of SSB has</p> |
| References Section Example | <p>References</p> <ol style="list-style-type: none"> 1. Duffey KJ, Popkin BM. Shifts in patterns and consumption of beverages between 1965 and 2002. <i>Obesity</i>. 2007;15(11):2739-2747. 2. Nielsen SJ, Popkin BM. Changes in beverage intake between 1977 and 2001. <i>Am J Prev Med</i>. 2004;27(3):205-210. 3. Drewnowski A, Bellisle F. Liquid calories, sugar, and body weight. <i>Am J Clin Nutr</i>. 2007;85(3):651-661. |

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References

Citing AMA guide website. <http://libguides.stkate.edu/content.php?pid=99799&sid=749106>. Updated April 2011. Accessed October 24, 2012.

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EDITORIAL

In modern years, aesthetics has become quite important in every aspect of everyday life: following the hundreds of journals, magazines, blogs and websites pointing their attention towards this interesting and fascinating topic, the request for aesthetic medicine has increased manifolds.

Aesthetic Medicine is a new field of medicine, in which different specialists share the aim of constructing and reconstructing the physical equilibrium of the individual. Treatment of physical aesthetic alterations and unaesthetic sequel of illnesses or injuries, together with the prevention of aging, are perhaps two of the most iconic areas of intervention for Aesthetic Medicine. However, in order to prevent frailty in the elderly, a program of education is similarly important. Furthermore, the line between health and beauty is extremely thin: psychosomatic disorders resulting from low self-esteem due to aesthetic reasons are frequent and cannot be ignored by a clinician.

It is therefore clear that there is no figure in the field of medicine which is not involved in Aesthetic Medicine: endocrinologists, gynecologists, angiologists, psychologists and psychiatrists, plastic surgeons, dermatologists, dieticians, physiotherapists, orthopedists, physical education instructors, massophysiotherapists, podologists, and rehabilitation therapists are just some of the specialists who are sooner or later going to have to answer their patients' needs for aesthetic interventions. The involvement of all these specialists fits the description of health as defined by the WHO: "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" for which, undeniably, a team of different physicians is required.

The number of patients requiring medical consultation for esthetic reasons is rapidly increasing: in order to be able to provide adequate feedback, medical and paramedical specialists should be trained and, more importantly, should be taught how to work together. Existing Societies of Aesthetic Medicine from different countries share the aim of creating such teams and provide constant updates to the literature: the creation of an international network of specialists from all around the world under the

flag of Aesthetic Medicine represents a challenge, but at the same time it is the proof of the widespread interest in this topic.

The first issue of this Journal represents the results of the efforts of the many national Societies and of the *Union Internationale de Médecine Esthétique*, now together as one; it is our hope that in years to come this Journal might improve our knowledge in this field, and provide adequate scientific advancement in the field of Aesthetic Medicine.

Francesco Romanelli, MD
Editor-in-chief
Associate Professor at "Sapienza"
University of Rome

EDITORS' NOTES

Aesthetic Medicine, the booming medical activity

Aesthetic Medicine was born in France 40 years ago. The French Society of Aesthetic Medicine was the first of its kind in the world, followed by Italy, Belgium and Spain. Starts were rather difficult as aesthetic procedures in those early years were only surgical. At that time aesthetic doctors and cosmetic dermatologists had very few real medical procedures to offer to their patients for treating aesthetic problems on face and body.

At the beginning of the '80s, viable medical procedures started to emerge in Europe for aesthetic and cosmetic purposes. Mostly, at that time, they were imported from the United States: those included collagen injections for wrinkles (Zyderm by Dr. Stegman), and chemical peels (phenol by Dr. Baker, TCA by Dr. Obagi). But, subsequently, European research on Aesthetic Medicine gained momentum. Hyaluronic acid appeared on the market, as it was discovered that it could be used as a dermal filler for wrinkles.

During the '90s, the use of lasers offered aesthetic doctors and cosmetic dermatologists new possibilities. The "beam revolution" started with CO2 laser for facial resurfacing. Today, CO2 resurfacing is not used as much anymore, because of the long and difficult post-op. CO2 laser was replaced with the gentler Nd-YAG and Erbium lasers and more recently with non-invasive photonic devices for facial rejuvenation, including IPL, US and radiofrequency. These new technologies allow today's aesthetic doctors and cosmetic dermatologists to offer their patients procedures with low risk of post-op complications.

Then, Botulinum Toxin has "invaded" both sides of the Atlantic Ocean. Today, Botox injections are the most popular treatment for facial expressive wrinkles. Botox injections are now so common everywhere that many cosmetic surgeons have given up their bistouries for syringes.

Last but not least, development in Aesthetic Medicine is shown by mesotherapy and adipolysis. About lipolysis, new data and recent publications have explained that radiofrequency, ultrasounds and cryolyse could have positive action to dissolve fat and to improve some unaesthetic disorders like cellulite. The-

se non invasive procedures intend to replace the surgical liposculpture with success.

Nowadays, Aesthetic Medicine has the necessary tools to address all major disorders within the aesthetic field.

After 40 years, Aesthetic Medicine is now active in 27 countries in the world (France, Italy, Spain, Belgium, Morocco, Poland, Russia, Switzerland, Romania, Kazakhstan, Algeria, Brazil, Argentina, Uruguay, Venezuela, Colombia, Chile, Mexico, U.S.A, Canada, South Korea, and recently Ecuador, China, South Africa, Turkey, Ukraine and Georgia). All 27 national Societies are members of the *Union Internationale de Médecine Esthétique* (U.I.M.E.).

Aesthetic Medicine is taught in 8 countries (France, Italy, Spain, Brazil, Argentina, Mexico, Venezuela, Kazakhstan) in universities that deliver UIME's diplomas after 3 to 4 years of studies.

What is the future of Aesthetic Medicine?

In the last few decades, patients' desires to look and feel younge, have fueled Aesthetic Medicine and Cosmetic Dermatology: many different procedures have been developed to satisfy the demands.

As life-span have increased, patients today are not only asking about aesthetic procedures, they are also asking for a way to stay in good physical conditions in the last decades of their lives.

As a direct result, Anti-Aging Medicine, which covers skin aging and general aging, has recently emerged and expanded very quickly.

Anti-Aging Medicine can offer senior patients better nutrition, dietary supplementation with vitamins, minerals, antioxidants, and eventually hormone replacement therapy, but only when needed.

Today, and in the near future, both Aesthetic Medicine and Anti-Aging Medicine will offer to our patients, who now live longer, better wellness with aesthetic treatments for skin aging and anti-aging treatments for general aging.

Aesthetic Medicine is booming, but all medical practitioners should be correctly trained, so its future will be bright.

*Jean-Jacques Legrand, MD
General Secretary of UIME*

Aesthetic Medicine: a bioethic act

When in 1977 the Italian Society of Aesthetic Medicine published the first issue of the magazine "La Medicina Estetica" Carlo Alberto Bartoletti, the Founder, wrote an editorial in which traced the pathway of the discipline and of the Scientific Society, still valid and projected into the future.

Today from that Editorial Board arise an International Journal, which wants to be indexed, in order to give to the doctors practicing Aesthetic Medicine all around the world a solid basis of shared knowledge.

In the late '60s, what was called in Italy Aesthetic Medicine, moved its first steps thanks to "remise en forme and anti aging projects" imported from the experience the "Institutul de geriatrie Bucuresti", directed by Dr. Ana Aslan.

For this reason, there is the bioethical imperative that the Discipline should be first prevention, then return to physiology and finally correction.

The worldwide diffusion and the efforts of Industries born on the wave of the phenomenon have often led to choose the fastest route to achieve and maintain the physical aspect in the myth of beauty at all costs, without considering that aesthetic is not synonymous of beauty, but it is a balance between body and mind, and the role of the doctor is to take care of the Person globally and not only focusing on the correction of "a badly accepted blemish".

Faithful to the teaching of my Master had almost 50 years ago, this new journal will have the task of elevating the human resources, aligning and validating methodologies, but above all affirming the *humanitas* of the medical art in its purest sense to pursue the good and the graceful for the person who relies on it.

*Fulvio Tomaselli, MD
Honorary President of the Italian
Society of Aesthetic Medicine*

Aesthetic Medicine needs science. All over the world.

All Aesthetic Doctors know that science is the basis for safety. Safety is the most important issue in our discipline.

Unfortunately, Aesthetic Medicine is more often surrounded by marketing than by science, despite the hard work done by Scientific Societies all over the World. And, too often doctors working in this field are dealing with sellers that promote products with insufficient scientific studies. However, they sell it anyway. I think that doctors must learn that the first thing to ask about a medical device is the scientific background regarding that product: patients treated, follow up period, adverse events and, most of all, publications.

With this new International Journal completely dedicated to Aesthetic Medicine, proposed by the Italian Society of Aesthetic Medicine, endorsed by UIME and shared by all the National Societies of Aesthetic Medicine belonging to UIME, World Aesthetic Medicine wants to stimulate scientific production in this discipline to increase safety and quality in aesthetic medical procedures.

Another important goal of the Journal is to catalyze the proposal of new protocols and guidelines in Aesthetic Medicine, with the consensus of the entire Aesthetic Medicine Scientific Community.

What this Journal should achieve in the near future is to improve the number and quality of scientific production in Aesthetic Medicine, in order to allow this discipline to grow in the field of evidence based medicine, not only in the rationale field.

I hope this can be the start of a new era for Aesthetic Medicine, with the commitment of all Scientific Societies all over the world.

*Emanuele Bartoletti, MD
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Study of the capability of a special current in an isolated electrode to enhance the penetration of active principles through the skin

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ABSTRACT

Purpose: Electroporation consists in applying a very short, high voltage electric pulse to cause a temporary breakdown in the permeability of biological membranes. Its power is limited by many factors, especially including the physics and characteristics of the electric pulse. The alteration of these characteristics may result in an enhancement of the penetration of active principles through the skin. Electroporation device was tested under different configurations, some of which resulted in promising results.

Methods: Tissues were obtained from 6 male Sprague-Dawley rats. Pulse application was performed under different experimental conditions (tests). The skin penetration of a 100 µg/mL Toluidine blue O solution (gauze, moisturizing cream, and glycerol) was evaluated under the microscope.

Results: Different degrees of skin penetration were observed. Some experimental tests showed much better results than control tests.

Conclusions: electric pulse characteristics are determinant to enhance skin penetration, glycerol did not seem an appropriate vehicle to electropore this solution, and creams arise as a promising possibility to electropore active principles into the skin.

Keywords

Electroporation, skin, current, toluidine

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Introduction

Electroporation consists in applying a very short, high voltage electric pulse to cause pores, which is to say: a reversible ephemeral breakdown of the permeability of biological membranes^{1,2}. In medicine, this membrane breakdown has been used to increase the penetration of active principles (AP) through the skin^{3,4}. For many years, electroporation has been applied as a transdermal drug delivery enhancer^{5,6} and so far, it has been usually considered to be the gold standard of non-invasive transdermal delivery systems (TDS). Still, its power is limited by many factors³, especially including the physics and characteristics of the electric pulse⁷ (mainly because these will determine the size of the pore). Skin penetration is also limited by several other variables^{8,9} such as skin thickness, AP gradient (which basically depends on its concentration in the applied product) and AP molecular size. Fick's law (Figure 1) is an excellent approach to understand how alterations occur along the "skin-applied product" interface¹⁰. The aim of this experiment has been to evaluate the device's ability to introduce active principles during an electroporation treatment in a rat skin *in vitro* model.

$$J = \frac{KD}{h}(c_0 - c_i)$$

Figure 1 - Fick's Law
J: flow per surface, K: partition coefficient (corneal layer-formulation), D: corneal layer diffusion coefficient, h: corneal layer thickness, C_0 : surface concentration, C_i : inside body concentration ($C_0 - C_i$ = gradient).

Materials and Methods

Tissues were obtained from 6 male 56-day-old Sprague-Dawley rats (Harlan Interfauna Ibérica, Barcelona; Spain), weighing between 250 and 300 g, housed in a controlled environment (lights on from 8:00 AM to 8:00 PM; temperature at 23± 2°C and 40-50% humidity) and *fed ad libitum* with a standard chow diet (Harlan Interfauna Ibérica) and water.

Skin was obtained from spare tissues of sacrificed animals involved in other experiments whose procedures were approved by the Committee on Animal Bioethics and Care of the University of Barcelona and the Generalitat of Catalonia (Autonomous Regional Government), Spain. Following the 3Rs principles¹¹ (underpinning the human use of animals in scientific

research), no animals were sacrificed to conduct this study.

Fresh skin from the abdomen of rat cadavers was used. Fur on the abdominal area was removed with an electric razor and a hair-removing cream (Deliplus, Laboratorios Maverick, S.L.U.) was applied for 10 minutes in order to completely remove any remaining fur. The area was then cleaned with a towelette. Pulse application was performed under different experimental conditions (tests). High-voltage pulses were delivered using the electroporation device Dermaplus®, Novasonix S.L., Spain. The power was set at 70% or 100% of the maximum power provided by the device (Table 1) and electric stimulation was applied for 10 minutes.

During application, a gentle massage was carried out with the flat electroporation head in contact with the skin (Figure 2).

For each test condition, a control treatment (sham) was set: and the electroporation session was performed in the same way but with the device not plugged in to electric power.

Some similar current applied is based on HVPC (high voltage pulsed current). Manufacturer claims Dermaplus® to be based on a HVPC (CBA) in an isolated electrode with a 0.1 A, 5 v.p.p. output current potential difference (post isolation) - as per technical specifications.

In order to see the sites of local transport, all tests and shams were preceded by the application of a 100 µg/mL Toluidine blue O solution¹² in PBS pH=7.4 on the skin (Figure 2). Depending on the test, the solution was included in: a) 3 cm x 3 cm gauze, b) moisturizing cream, or c) glycerol (Table 1).

The treated area was again cleaned and Toluidine blue O solution excess was removed.

The moisturizing cream used was Avena Kinesia®, Grupo AC Marca, Spain. Ingredients: water, sorbitol, isopropyl palmitate, glyceryl stearate, PEG 40 stearate, cetearyl octanoate, mineral oil (paraffinum



Figure 2 - Set
Flat electroporation head, Toluidine blue O solution (moisturizing cream), shaved murine skin, current flow.

liquidum), cetyl alcohol, oatmeal (*Avena Sativa* L.), cetyl palmitate, octyl methoxycinnamate, glycerin, polyglyceryl methacrylate, dimethicone, stearic acid, benzophenone-3, sodium carbomer, allantoin, methylparaben, propylparaben, fragrance, 2-bromo-2-nitropropane-1,3-Diol.

The glycerol solution used was Panreac, Spain (ref. 1.31339.1212). A Kyowa Optical SD-2P, Japan, binocular microscope was used to observe the skin.

Results

In test 1 there was some blue staining on the dermis side that could also be seen on the sub-dermis side. This staining was not seen under the sham conditions of test 2.

| Test | Power | Toluidine 1% in: |
|------|------------|--------------------|
| 1 | 100% | Saturated gauze |
| 2 | Off (sham) | Saturated gauze |
| 3 | 100% | Moisturizing cream |
| 4 | Off (sham) | Moisturizing cream |
| 5 | 70% | Moisturizing cream |
| 6 | 100% | Glycerol |

Table 1 - Test conditions

In test 3, a huge extension of treated skin was stained blue on both the dermis and sub-dermis sides.

Since these conditions were thought to be very interesting for skin electroporation, the test was repeated. Unfortunately, the observed results were not the same witnessed in test 3.

Test 4: sham conditions for test 3. Small spots were observed on the dermis side though they were smaller than the ones obtained in test 3 (Figure 4).

Test 5: same conditions used for test 3 but with the power cut to 70%. Small blue spots were observed on the dermis side of the skin. Results are not included in the figures.

Test 6: Taking into account that glycerol is one of the main ingredients of the moisturizing cream, 1% toluidine blue O solution was included in glycerol. Again, small blue spots were observed on the dermis side of the skin, similar to those detected in sham tests 2 and 4.

Results are not included in the figures.

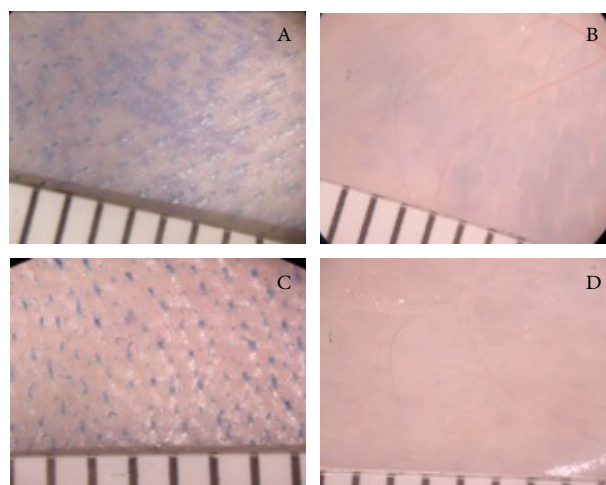


Figure 3 - Tests 1 and 2

A: test 1 epidermis side; B: test 1 sub-dermis side; C: test 2 (sham) epidermis side; D: test 2 sub-dermis side

Discussion

The first conclusion drawn was obvious and not at all new: the stronger the current, the better the results¹³. Further studies should provide new data so as to enhance as much as possible the electroporation device's power without compromising safety (skin burns)¹⁴.

Post-electroporation tests 2 and 4 (control conditions for tests 1 and 3) are shown in figure 3 (C and D) and 4 (C and D) respectively. They show no staining. The same happened to post-electroporation evaluation of test 5 (resembled test 3 but using less electroporation power).

Out of the 3 conditions that worked on full power (tests 1, 3 and 6), test number 6 showed no better results than the sham tests, suggesting that glycerol was indeed not the right vehicle for this AP¹⁵.

The most successful tests, in which post-electroporation staining could be observed on both sides of the skin, were test 1 and test 3.

Although any visual comparison between them could only be subjective, test 3 seemed to result in larger and more intense (in contrast) stained areas.

These results might have been unexpected up to some extent. Water plays an important role in electroporation by electrosmosis⁹ and an aqueous solution always seems a better option than a cream. In this case, the increased direct contact between the cream and the skin might have been determinant. Also the gauze may have affected the solution kinetics in some way. Still, the cream arises as an interesting option for future electroporation protocols. Further research should confirm or disprove this hypothesis.

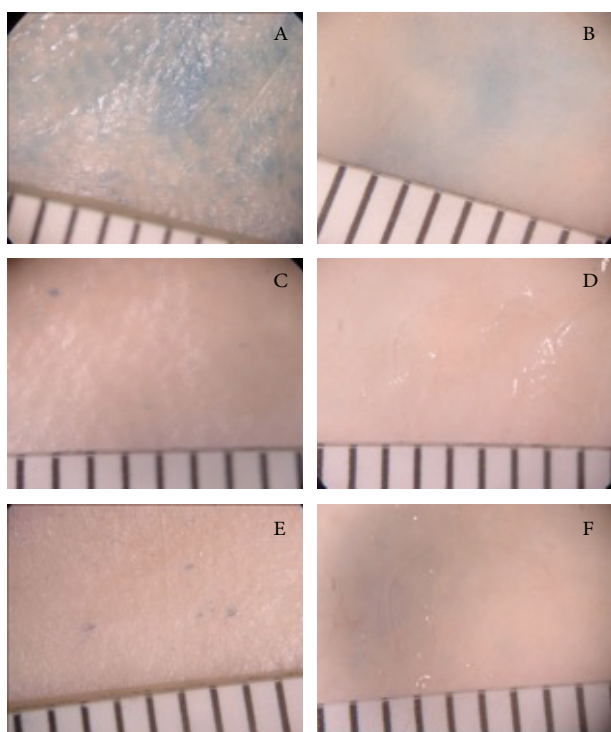


Figure 4 - Tests 3 and 4
 A: test 3 epidermis side; B: test 3 sub-dermis side; C: test 4 (sham) epidermis side;
 D: test 4 sub-dermis side; E: test 4 (sham) epidermis side; F: test 4 sub-dermis
 side

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Hyaluronic acid hybrid cooperative complexes and the BAP (Bio Aesthetic Points) technique: the new edge in biorejuvenation

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ABSTRACT

The subject of this evaluation is a new generation, natural hyaluronic acid (HA), formed by stable hybrid cooperative complexes of high (H-HA) and low (L-HA) Molecular Weight (MW) HA. The dual action, owing to the presence of the two MWs, is ideal for remodeling skin laxity in the malar and sub-malar areas. These hybrid cooperative complexes are obtained thanks to a patented thermal technology enabling the formation of hydrogen bonds between the two molecules.

As a result, the two MWs protect each other from enzymatic degradation, prolonging the duration of the injected product, as compared to traditional biostimulation. The formation of hybrid cooperative complexes also significantly reduces viscosity, thus allowing the use of a high concentration of HA (32 mg/ml), while at the same time, maintaining manageability and diffusibility in the tissue.

These chemical and physical characteristics have allowed us to develop a new injection technique and a favorable protocol. The Bio Aesthetic Points (BAP) Technique identifies 5 points on each side of the face. This translates into fewer injection points, a lower possibility of side effects (bruises), and fewer sessions spaced over time with respect to a standard biostimulation protocol, for greater patient comfort and compliance.

Keywords

natural hyaluronic acid, hybrid cooperative complexes, biostimulation, bioremodeling

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Introduction

During the aging process, skin physiology undergoes different changes which lead to a slowing of metabolic processes and normal cellular activities (chrono-aging)¹.

Extraneous factors, such as sun exposure (photo-aging)², smoking³, improper nutrition, unsuitable cosmetics⁴, compounded in varying proportions with the effects of chrono-aging, give rise to clinical manifestations of skin aging with the appearance of wrinkles, pigmentation disorders and changes in cutaneous parameters⁵.

There are many solutions that aesthetic medicine uses to combat the effects of skin aging⁶ including instrumental treatments (laser, IPL)^{7,8}, topical treatments such as peelings^{9,10}, antioxidants supplements¹¹, and injection treatments (biostimulation, fillers, botulinum toxin).

Cutaneous biostimulation is a well-established method used to counteract the skin aging effects, and has now become common practice in aesthetic medicine^{12,13,14}.

On the market there are many biostimulation products mainly based on natural Hyaluronic Acid (HA)^{15,16,17}, some of which contain added vitamins, amino acids, antioxidants, available in vials or pre-filled syringes. It has been widely demonstrated how HA is able to stimulate the fibroblast receptors leading to their proliferation and increased collagen production, namely the main component of the dermal matrix^{18,19}.

The traditional biostimulation protocol involves a series of 4-6 weekly sessions, with monthly maintenance. Multiple intradermal injections of the product are performed (nappage or micro-papular techniques), while more viscous products can be injected by using the linear retrograde technique.

The most frequent complaints from the patients are the discomfort caused by multiple injections and bruising.

With the aim of obtaining products with better characteristics in terms of efficiency and duration, but also to supply to these light but very frequent complains, a new product has emerged.

This medical device, based on stable hybrid cooperative complexes of HA produced thanks to a new technology (NAHYCO), is the outcome of the research conducted by the Second University of Naples, at the BioTekNet Department of Experimental Medicine, Biotechnology, Medical Histology and Molecular Biology²⁰.

The aim of this retrospective analysis, was to evaluate the efficiency, tolerability and duration of the skin bioremodeling effect of the hybrid cooperative complexes by using the BAP (Bio Aesthetic Points) technique, but also to verify and understand the possible advantages compared to the traditional biostimulation.

Materials and methods

A retrospective evaluation was performed on 15 female patients (aged between 39 and 65, mean age 53). Before the treatment the patients were informed about the risks and benefits and an informed consent form was signed.

Exclusion criteria

- Patients with permanent fillers in the injection site
- Patients being treated with hemostasis disorders and/or coagulants
- Patients with autoimmune collagenopathies
- Patients with an active skin infection or inflammation
- Patients with localized head infections or generalized inflammation
- Chronic inflammatory state
- Hyper sensibility to HA
- Pregnancy or breast-feeding

In this evaluation, a new medical device for intradermal use containing 64 mg of hyaluronic acid sodium salt in 2 ml of buffered saline (HA concentration 32mg/ml) was employed. The device, produced and distributed by IBSA Farmaceutici Italia Srl, is called "PROFILO®" and is available in a blister containing a 2.25 ml syringe with two 29G TW 13 mm needles.

This product is based on hybrid HA cooperative complexes. NAHYCO® technology is a patented thermal process which allows the combination of 32mg low molecular weight (L-HA, MW: 80 - 100 KDa) and 32mg high molecular weight (H-MW, 1100 - 1400 KDa) ultrapure hyaluronic acid sodium salt to create the stabilised hybrid cooperative complexes with a total HA concentration of 32 mg/ml.

The stabilised hybrid HA cooperative complexes are produced without the addition of any chemical cross-linking compound, with a thermal technology involving a phase of controlled heating followed by a phase of controlled cooling.

This process enables the formation of hydrogen bonds between the two MWs.

The hybrid cooperative complexes have several advantages compared to H-HA and the L-HA alone¹⁵:

- Greater half-life - hybrid cooperative complexes have a greater resistance to hyaluronidase (BTH) compared to H-HA, because the two MWs protect each other from enzymatic degradation;
- Low inflammatory response - TGF-β1 are less up-regulated in hybrid cooperative complexes treated samples compared to cells treated with L-HA;
- Low viscosity - hybrid cooperative complexes have a lower viscosity than L-HA and H-HA alone.

In order to maximize the benefits of hybrid cooperative complexes (high concentration, spreadability, long tissue duration and high biological activity), the BAP (BioAesthetic Points) technique, a safe, effective and minimally invasive technique has been developed^{21,22} and here employed to evaluate the effect on skin laxity associated with the malar/submalar area, but also to analyse the advantages compared to the traditional biostimulation.

The BAP technique has been developed thanks to the features of low viscosity and high spreadability of the hybrid cooperative complexes that, once injected in five boluses following the scheme in Figure 1, achieves a homogeneous result with a high lifting effect.

Identifying the BAP (Figure 1)

1. Zygomatic protrusion at least 2 cm away from the lateral canthus of the eye;
2. 1.5 cm anterior to the inferior margin of tragus
3. 1.5 cm above the mandibular angle;
4. 1.5 cm away from the middle of the chin;
5. 1.5 cm away from the nasal base: at the intersection between the pupil line and the horizontal line starting from the nasal base.

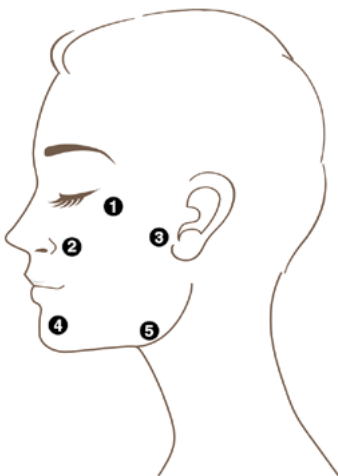


Figure 1

Figure 1 - Location of the BAP

1 ml per side was injected during each treatment and 2 treatments with a 4 week interval were performed

During the follow-up visits (4 weeks and 8 weeks after the first treatment), viscoelasticity (Uv/Ue) and skin hydration were measured for each patient, with the Dermotricos MicroCAMERA[®]. Skin hydration was measured as hydration %: a hydration % lower than 40% is considered as low hydration, between 40 and 70% as normal hydration, higher than 70% as high hydration. Skin viscoelasticity (Uv/Ue) represents the viscoelastic

properties of the skin over the immediate deformation: is the ratio of viscoelastic resistance (Uv) and the elastic resistance (Ue)²³. Uv/Ue is a useful parameter to evaluate the efficiency of topical and intradermal treatments²⁴⁻²⁶, as well as diseases compromising skin elasticity²⁷. The measurements were conducted at controlled parameters (21°C, 30-40% relative humidity). Statistical analysis of the data was performed by using the one tailed paired T Student's test.

At each follow-up visit the patients' satisfaction also was rated, asking if they were "unsatisfied", "satisfied" or "very satisfied." In addition, at each treatment and/or control session, photographic documentation was collected from the patients who signed a release for the use of the images.

The protocol was as follows:

- T0: Baseline visit + FIRST TREATMENT
- T4W (4 weeks from T0): First follow-up visit + SECOND TREATMENT
- T8W (8 weeks from T0): Second follow-up visit

Results

The full data of the instrumental evaluation of the hydration and viscoelasticity are reported in Table 1 and Table 2 respectively, together with mean and standard deviation (SD) values, illustrated in Figure 2 and Figure 3 respectively.

The statistical analysis showed a significant increase (Student's Test <0.05) of skin hydration after only one treatment as showed in Table 3, while viscoelasticity improved significantly (Student's Test <0.05) in both sides of the face after the second treatment.

The results can be evaluated also in Figure 4 (a-b) and Figure 5 (a-b).

Only 2 of the patients were "unsatisfied" after the first treatment, 10 were "satisfied" and 3 very "satisfied". After the second treatment 9 patients were "satisfied and" and 6 were "very satisfied".

In only 2 treatments bruising was reported by the patients at the injection site and in one case more persistent swelling (lower than 24 hours) at the injection site. These side effects disappeared within two days.

| | Baseline | | 4 weeks after the first treatment (T4W) | | 8 weeks after the first treatment (T8W) | |
|-------------|------------|-----------|---|-----------|---|-----------|
| | Right side | Left side | Right side | Left side | Right side | Left side |
| Subject 1 | 27 | 28 | 23 | 42 | 54 | 52 |
| Subject 2 | 18 | 16 | 21 | 32 | 40 | 43 |
| Subject 3 | 34 | 38 | 40 | 47 | 45 | 50 |
| Subject 4 | 35 | 29 | 69 | 85 | 72 | 79 |
| Subject 5 | 40 | 34 | 43 | 42 | 50 | 53 |
| Subject 6 | 37 | 28 | 33 | 47 | 38 | 42 |
| Subject 7 | 22 | 28 | 52 | 65 | 58 | 62 |
| Subject 8 | 12 | 17 | 35 | 53 | 40 | 56 |
| Subject 9 | 37 | 30 | 49 | 58 | 53 | 57 |
| Subject 10 | 45 | 46 | 41 | 45 | 41 | 50 |
| Subject 11 | 45 | 39 | 82 | 78 | 51 | 49 |
| Subject 12 | 31 | 21 | 69 | 68 | 71 | 71 |
| Subject 13 | 30 | 44 | 73 | 70 | 75 | 72 |
| Subject 14 | 30 | 29 | 58 | 63 | 60 | 62 |
| Subject 15 | 11 | 20 | 52 | 37 | 60 | 43 |
| MEAN | 30 | 30 | 49 | 55 | 54 | 56 |
| SD | 11 | 9 | 18 | 16 | 12 | 11 |

Table 1 - Skin Hydration (%)

| | Baseline | | 4 weeks after the first treatment (T4W) | | 8 weeks after the first treatment (T8W) | |
|-------------|------------|-----------|---|-----------|---|-----------|
| | Right side | Left side | Right side | Left side | Right side | Left side |
| Subject 1 | 75,2 | 82,1 | 76,1 | 88,1 | 95,5 | 99,1 |
| Subject 2 | 88,5 | 72,3 | 87 | 85,9 | 88 | 86,9 |
| Subject 3 | 68,3 | 70,1 | 70,6 | 74,7 | 72 | 79,3 |
| Subject 4 | 76 | 84,3 | 89 | 87,5 | 92 | 89,5 |
| Subject 5 | 74,9 | 88,9 | 77,7 | 77,8 | 82 | 81,6 |
| Subject 6 | 63,3 | 82 | 86,5 | 89,1 | 88,2 | 92,8 |
| Subject 7 | 98,2 | 86,6 | 94,3 | 86,1 | 95,2 | 91,2 |
| Subject 8 | 69,9 | 86,7 | 78,1 | 87,3 | 80,2 | 89,9 |
| Subject 9 | 96,7 | 89,4 | 98,5 | 84,2 | 98,9 | 87,2 |
| Subject 10 | 82,3 | 88,4 | 92,8 | 98,2 | 93,6 | 98,5 |
| Subject 11 | 88,6 | 81,7 | 82 | 77,8 | 84,2 | 81,1 |
| Subject 12 | 68,6 | 73,3 | 74,9 | 78,1 | 75,3 | 78,1 |
| Subject 13 | 70 | 84,9 | 84,9 | 82,8 | 85,3 | 83,7 |
| Subject 14 | 96,9 | 96,9 | 97,22 | 80,13 | 98,2 | 85,1 |
| Subject 15 | 83,7 | 85,3 | 82,3 | 82,3 | 83,2 | 84,1 |
| MEAN | 80,1 | 83,5 | 84,8 | 84,0 | 87,5 | 87,2 |
| SD | 11,6 | 7,1 | 8,5 | 5,9 | 8,2 | 6,4 |

Table 2 - Skin Viscoelasticity (Uv/Ue)

| | T4W vs T0 | | T8W vs T0 | |
|-------------------------------------|-------------|-------------|-------------|-------------|
| | Right side | Left side | Right side | Left side |
| SKIN HYDRATION (%) | 0,000523798 | 1,01946E-05 | 3,42381E-05 | 1,45593E-06 |
| SKIN VISCOELASTICITY (Uv/Ue) | 0,019017854 | 0,409828894 | 0,002911052 | 0,047281223 |

Table 3: Student's Test on skin viscoelasticity (Uv/Ue) and skin hydration (%)

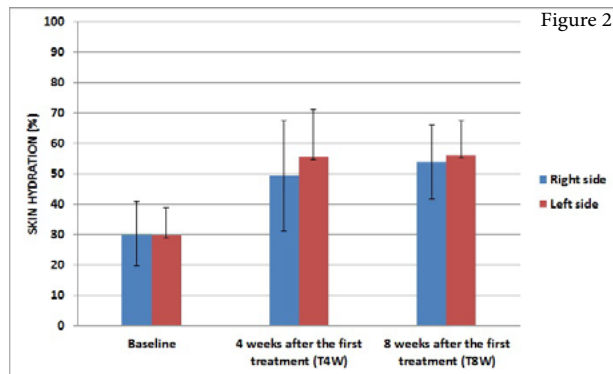


Figure 2 - Skin Hydration (%): Mean and SD

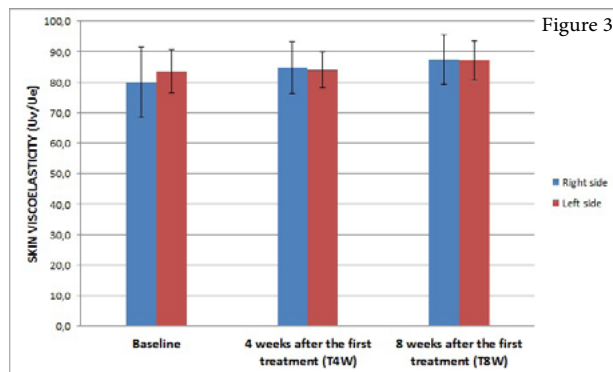


Figure 3 - Skin Viscoelasticity (Uv/Ue): Mean and SD



Figure 4 - Patient age 64. 4a: before treatment - 4b: 4 weeks after the second treatment



Figure 5 - Patient age 65. 5a: before treatment - 5b: 4 weeks after the second treatment

Discussion and conclusions

Stable hybrid cooperative complexes represents a new generation of hyaluronic acid dermal filler, allowing to achieve a concentration never reached before, precisely because of technological limitations. It is important to point out that this process does not involve the use of chemical cross-linking agents and that the final product is hyaluronic acid sodium salt only. This means an improvement in terms of safety and biocompatibility.

The BAP were chosen according to two criterias: risk reduction and maximization of the diffusion of the product administered in the malar and submalar areas, which are particularly predisposed to dermal atrophy caused by the aging phenomena.

Traditional biostimulation shows several limitations: many injections, greater patient discomfort, increased possibility of bruising, protocol requiring many treatment sessions, greater time commitment for the patient.

Compared to traditional biostimulation, the new technique with this new generation hyaluronic acid complexes allows to achieve several advantages: only 5 BAP injection sites per side of the face, reduced pain (slow injection), less chance of bruising and hematoma, fewer treatment sessions and better patient compliance.

The doctor is able to easily identify the BAP. Injection is not particularly difficult, owing to the smooth extrusion with a 29G Thin Wall needle, despite the high

concentration of hyaluronic acid (32 mg/ml - 64 mg/ml per syringe), less time for each treatment session.

The patients reported having experienced less pain and less bruising than traditional biostimulation. They appreciated the reduced time and number of sessions, and were generally satisfied with the overall improvement of the face and long lasting results.

The hybrid cooperative complexes allow the treatment of skin laxity, wrinkles and folds of the middle and lower third of the face with a significant improvement of skin hydration and viscoelasticity, combined with a high level of compliance and satisfaction referred by the patients.

Objectivity in the post treatment showed better skin turgor (similar to a tightening effect), brighter skin, reduced nasolabial fold depth, and improved texture and pigmentation. This is clearly visible in the photos above, relating to patients who signed the image release.

The HA hybrid cooperative complexes used with BAP technique have helped overcome some traditional biostimulation limitations, improving patient comfort and compliance and giving the aesthetic practitioner a new tool with the ability to remodel skin laxity in the malar and submalar areas.

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Food and adolescence: a review

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ABSTRACT

In the adolescence period, the somatic growth and the psychological and behavioural development that inevitably lead youth towards the desire for autonomy and independence are accomplished. Obviously the relationship with food is involved too. Nutrition, moreover, like other behaviours, is for the adolescent a way of communicating with the rest of the world. In recent years, we have witnessed a globalization even in eating behaviours and its lexicons: fast food, soft drinks, snacks, chips, popcorn, crackers, hamburgers have become neologisms of current use especially among young people in every part of the world. Fast food and soft drinks are increasingly widespread habits and are an indication of the tendency to nibble food constantly, a habit in consuming food any time away from home, where it is more appetizing and richer in calories. Then it may happen that overweight, obesity and eating disorders occur with an immediate impact already at this period of life and, later in adult life.

Keywords

Adolescence, obesity, overweight, eating disorders, breakfast

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Introduction

Adolescence is one of the most exciting yet challenging periods in human development. It is a period of enormous physiological and cognitive transformation during which a child becomes a young adult. The cognitive and emotional changes allow teenagers to become more independent. Peer influence and acceptance may become more important than family values, creating periods of conflict between teenagers and parents. Because all of these changes have a direct effect on their nutritional needs and their eating behaviours, it is important that health care providers develop a full understanding of how these developmental changes of adolescence can influence nutritional status¹.

Food habits that are seen more frequently among teenagers than other age groups are especially due to the decreasing influence of family, increasing influence of peers, exposure to the media, employment outside home, greater spending capacity, and increasing responsibilities that leave less time for teenagers to eat meals with their families².

Parents can positively influence the food and beverage choices of teenagers by modeling healthy eating habits, selecting healthy foods for family meals. Friends influence each other through modeling and shared activities, such as eating out at fast-food restaurants and buying snacks at stores near school³⁻⁴.

Teenagers who eat at home more frequently have been found to consume fewer soft drinks and more calcium-rich foods, fruit and vegetables⁵.

The frequency with which teenagers eat meals with their families decreases with age⁶.

Adolescents who eat meals with their families have been found to have better academic performance and to be less likely to engage in risky behaviors such as drinking alcohol and smoking compared with peers who do not frequently eat meals with their families⁷.

Perception of Body Image

In America, data from the *Youth Risk Behavior Survey (YRBS)* found that 16% of U.S. High School students described themselves as being overweight despite being of normal weight⁸. Females were more likely to report this misperception than males (25% vs 7%) and this can lead to problems with weight control and diet relationship. Data from the 2007 YRBS show that 45% of U.S. High School students were trying to lose weight at the time of the survey. The prevalence of dieting increased with age among females, but decreased with age among males.

In Italy, according to a survey among teenagers⁹, 69.2% of the interviewees declare that they are quite satisfied with or really like their look, but percentages are very different between the two genders: 56.3% of

girls against 81.4% of boys. Moreover, 42.5% of the girls would like to be thinner, 34.5% more beautiful; the boys, instead, would like to be more muscular (42%). 25.3% of adolescents are afraid of gaining weight, especially the girls (38.9% of females vs. 12.6 % of males) and 10.7% is very aware of and careful about their food intake (14% of the girls against 7.6% of the boys). 41.9% of teenagers have undertaken a diet, with a female prevalence (53.4% of the girls vs. 31.2% of the boys) and in the age range between 15-19 (49.5% vs 32.3% of 11-14 yrs. old).

Most teenagers, that have begun a diet, consulted a nutritionist before beginning it (40.5%), but 1 out of 10 searched for it on the Internet (11.8%), 1 out of 5 simply invented one by themselves (20.6%) or followed their parents' advice (22%). To reach their ideal body image, females go on a diet and think about aesthetic surgery, while males undergo intense physical exercise to burn calories (typical behavior in 23.2% of the boys and 15.1% of the girls). Thus, focusing on one's own body image can influence both female and male behavior. Only 28% of males and 13% of females declared, "I'm fine the way I am".

According to another survey⁹ 6 out of 10 Italian teenagers would like to be thinner, have more breast volume, and almost 8 out of 10 would like to have more beautiful legs and in general be more attractive.

Mass media, Internet and Advertising

Surely the media and particularly Internet have an important role in influencing and characterizing teenagers' habits and life-styles. According to the survey "Italian Adolescents Habits and Life-styles" conducted by the 16th edition of the Italian Society of Pediatricians in 2013-2014, initiated in 1997 when Internet literally "did not exist" in teenagers' lives, the embedding of this "sui generis technology" was reported year after year in the new generations' lives. It was indicated as "*sui generis technology*", because it is much more than a technological tool, it is a sort of *passé-partout* leading to a "*second life*" which seems more to compete victoriously with traditional "*life*" as time passes by. For adolescents Internet is essentially a "Social Network". Not by chance the leap forward (dated 2008) pretty much coincides with the Facebook explosion¹⁰.

One of the latest trends that is sizzling on the web is called the "Thigh Gap", which is the space that should be included between the root of the inferior limbs to make the female body more attractive. The "Thigh Gap" is becoming an obsession among teenagers who are willing to do anything to obtain it, even the worst behaviours: forced fasting, intense physical activity.

The Internet and the Media were mentioned, but we cannot put aside the role that advertising plays. The influence of advertising on our relationship with

food was underlined by the researchers of Dartmouth College, who demonstrated that in overweight teenagers TV commercials advertising unhealthy food excessively activate cerebral areas related to taste, reward and parts of the somatic-sensorial cortex which control the mouth: a mental simulation of chewing the food advertised¹¹.

More generically, the *marketing* piloted to teenagers has become a multimillion business. It is estimated that the most important food and beverage companies in the U.S. spend 1.6 billion dollars a year to advertise their products for teenagers¹².

Since the time that they are exposed to the media has increased in the last years¹³, so has the ability of advertising producers in influencing their eating behaviours. It is estimated that teenagers (13-17 years old) watch more than 28,000 commercials a year or more than a total of 217 hours of advertising. Over 20% of TV commercials viewed by teenagers are about food products¹⁴, and most of the commercials are about food (89 %) high in fat, sugars and sodium¹⁵.

Overweight, Obesity and Nutrition Behaviour

Mentioning the desire to be slim and the fear of gaining weight, there is another issue: overweight and infantile and adolescent obesity, which register alarming numbers worldwide.

In the U.S. 17% of young people are obese, even though in general there have not been significant changes in the prevalence of obesity among them between 2003-2004 and 2011-2012. In any case obesity has quadruplicated in the last 30 yrs¹⁶.

In Europe the prevalence of juvenile obesity is ten times greater than in the 70's¹⁷.

In Italy nowadays 26.9% of young people aged between 6 and 17 are overweight. This phenomenon is more widespread among boys, especially among those who live in families that consider their economic resources insufficient and above all among those whose education level is lower. Besides, teens who live in families in which at least one of their parents is overweight have a tendency to become overweight or obese. If both parents are overweight the percentage of children and adolescents between 6 and 17 years old that are overweight increases to 38.1% compared to the percentage of 28.1% (when just the mother is overweight) and of 26.1% (when just the father is overweight). When both parents do not have weight problems the percentage decreases to 20.4%. In the prevention of excess weight a fundamental role is played by the family's environment especially by the mothers who are children's main caretakers and can give them a healthy lifestyle and urge them to practice physical activity and sports¹⁸.

All of this must make us reflect about the role of the families in the increase of excess weight. Besides

genetics, children also inherit from their parents their lifestyle and thus the right nutrition habits.

Scientific literature supplies evidence of a close relationship between overweight/obesity in infancy and adolescence and overweight/obesity in adulthood¹⁹.

Overweight and obesity are a result of "calorie unbalance" and are influenced by genetic, behavioural and environmental factors²⁰.

Besides the total amount of calories, the diet composition is also important. A diet rich in fat leads to an accumulation of lipids caused by *Caloric Density, Palatability, and Thermogenic Characteristics*^{21,22}.

Adolescent obesity has both short and long-term health consequences²³:

T2DM, Metabolic syndrome, Functional hyperandrogenism, Cardiac pathologies (many of the cardiovascular consequences that characterize adult obesity are preceded by anomalies that begin during childhood. Hyperlipidemia, hypertension and abnormal tolerance to glucose occur more frequently in obese children and adolescents²⁴), *Asthma and other respiratory problems, Sleeping disorders, Orthopedic disorders, Acanthosis Nigricans. Pseudotumor cerebri, Tumors of the gastroenteric tract* (Levi Z. and his team studied the association between being overweight in the adolescence period and the incidence of pancreatic cancer in a group of 720,927 Jewish Hebrews. Being overweight in the adolescence period was substantially associated with the incidence of pancreatic cancer in the young and mid-life period²⁵).

There are also social, emotional and psychological consequences²⁶: anxiety, depression, self-esteem and bullying²⁷.

Regarding bullying, a Canadian research examined 5,749 boys and girls aged between 11 and 16 and relation between various forms of bullying and being overweight, showing a clear correlation between the extent of overweight and the victimism caused by peers. In a group aged between 14 and 16 years old obese or overweight girls not only put up with bullying, they practice it as a reaction to the marginalization tendency of their peers²⁸.

Recent guidelines for adolescent overweight and obesity suggest a staged care treatment process based on a teen's BMI, age, motivation and the presence of comorbid conditions²⁹.

If on the one hand there is overweight and obesity, on the other hand there are Eating Disorders (EDs), which are characterized by a persistent disorder in eating behaviour that puts into practice consumption and altered food adsorption which seriously endanger health. According to the new DSM V, they are classified in: Pica, Rumination Disorder, Avoidant/Restrictive Food Intake Disorder, Anorexia Nervosa, Bulimia Nervosa, Binge-Eating Disorder, Other Specified Feeding or Eating Disorders and Unspecified Feeding or Eating Disorder³⁰.

EDs have a complex aetiology, factors of genetic and

environmental risk are present. Concerning the first, it has been demonstrated that EDs are more frequent among first degree relatives of patients with Anorexia Nervosa and/or Bulimia Nervosa compared to healthy subjects' relatives³¹. In patients' relatives, besides a greater prevalence of both types of EDs, a greater frequency of depression, disorders caused by alcohol abuse or dependence, obsessive compulsive disorders were found^{31,32}. Environmental risk factors do not seem to be less important³³: socio-cultural factors, stressful and traumatic events, perinatal factors, family factors. A metaanalysis of 2006³⁴ identified among the psychological characteristics associated with an increased risk of developing an Eating Disorder: following a diet, perfectionism, depression, impulsivity and substance abuse. Other studies identified further risk factors³⁵: the pressure to be thin tied or linked to certain lifestyles and working or sports environments, the previous presence of overweight or family obesity, being picked on because of one's appearance during adolescence, sexual abuse, the presence of anxiety disorders. Even some obstetric complications seem to significantly increase the risk of developing anorexia nervosa³⁶.

Anorexia mainly afflicts adolescents, with a prevalence of around 0.3% in 2003 while the incidence of 8 cases on 100,000 subjects in a year³⁷. In 2007, the prevalence was around 0.5%³⁸ or, according to another research, it had gone over 2%³⁹. According to DSM V, the prevalence of anorexia nervosa among young women is around 0.4%³⁰.

The prevalence of bulimia nervosa among young women is of 1%-1.5%. The prevalence is higher in late adolescence and among young adults. Both Anorexia Nervosa and Bulimia Nervosa are prevalently female disorders: in the DSM V a ratio of 10:1 females-males is reported for the first and circa 10:1 for the second³⁰.

Also other disorders are more and more frequent, from Orthorexia to Vigorexia, to Drunkorexia, Nocturnal eating, Selective yearning, Emotional eating, etc.

Adolescents are particularly vulnerable to the complications of eating disorders. The effects of malnutrition on growth in height, brain development and bone tissue can be persistent and irreversible⁴⁰.

Among obesity and eating disorders, four risk factors have been evidenced: *diet, mass media influence, body dissatisfaction and jokes about excess weight and body shape*. The identification of risk factors that are shared between these weight-related disorders is an essential step to developing effective prevention interventions⁴¹.

Common Mistakes during Adolescence

More frequently reported habits among adolescents compared to other age groups include skipping or underestimating breakfast, irregular meal

consumption, excessive snack consumption, eating away from home (especially at fast food restaurants), dieting.

In the USA and in Europe 10% to 30% of children and teenagers usually skip breakfast and the percentage is higher in adolescents and in females⁴².

The role played by parents in having their children eat breakfast seems to be fundamental, in fact various studies indicate how parents are a role-model for their children regarding eating habits⁴³.

As to beneficial effects of this meal on health, first of all it must be considered how, at the end of nocturnal fasting, it represents the first source of energy to deal with daily activities, both intellectual and physical⁴⁴. Particularly in the late morning, when memory and attention decrease, having eaten breakfast has a positive effect⁴⁵.

Furthermore, children and teenagers who do not have breakfast consume a larger quantity of food later, during the following meal. Not only but the calories and lipid contents is higher because of the sensation of hunger: breakfast thus serves the purpose of regulating the daily energy supply⁴⁶.

If it is important not to skip breakfast, its composition is also fundamental. Two types of breakfast were compared, each with the same contents of carbohydrates, but with a different glycemic index. It was observed how the slower release of glucose is associated with a better capability of memorizing in the late morning⁴⁷.

The eventual association of fiber would render the cognitive performance more appreciable thanks to the capacity of the fiber in slowing the absorption of glucose⁴⁸. The consumption of a low glycemic index breakfast conditions the successive energy supply influencing the release and the activity of the Incretins, implicated in the regulation of the postprandial satiety and of the glycaemia⁴⁹.

Skipping breakfast is correlated to a greater Body Mass Index, to larger abdominal circumference and to a higher incidence of obesity; if breakfast is based on cereals, such anthropometric measurements are smaller compared to those who consume other types of breakfast⁵⁰. Moreover skipping breakfast seems to be greatly associated with overweight compared to a sedentary life and to the consumption of alcoholic beverages⁵¹. The habit of skipping breakfast denotes the tendency of unhealthy life-styles. In fact the students who do not have breakfast smoke ($p < 0.001$), do not practice sports ($p < 0.002$) and are more obese ($p < 0.002$) than their peers⁵².

Among teenager's eating behaviours another widespread habit is the tendency "to nibble" food continuously, driven from time to time by appetite, by the desire to share something with their friends, by gluttony, by the will to freely consume food that the family allows with moderation because otherwise it would alter the normal eating patterns, from the desire

to follow advertising suggestions. It was surveyed in England that teenagers consume more snacks than any other age group: about one fourth of their caloric intake is made up of chocolate sweets, crispy fries, soft drinks and juices.

More and more widespread is also the habit of consuming food between meals, together with friends, away from home, especially trendy food because it is unusual and far from their geographical and cultural traditions. A striking example is *fast food*! A questionnaire that was given to more than 3000 Italian high School students evidenced the great attraction that this way of eating has on teenagers, not only because of the typology and the convenient prices but also because of the particular atmosphere of the surroundings that derives from the architectural style, the furniture and the presence of young customers. 80% of the young people interviewed often go to fast food restaurants, 36% of the boys and 24% of the girls go once or more times a week⁵².

The great increase in the number of fast food restaurants (in USA 30,000 to 220,000 from 1970 to 2001) contributes to annul the traditional, ritual and convivial role of meals and endangers the regional cooking's identity. At fast food places, meals made artificially appetizing and high in caloric content are consumed very quickly, with an eating behavior which is defined gorging. It is useful to confirm that the new fast food culture annuls the socializing meaning of meals. Besides fast food, soft drinks which are beverages mainly edulcorated with fructose are greatly widespread⁵³.

As already said meals consumed away from home are a considerable energy source, particularly in adolescence, but in all age groups. They are associated with a more important energy intake deriving from fats and low supply of micronutrients⁵⁴. Eating behaviors finalized in only one diet and in the repeated and habitual consumption of lunches/dinners away from home (for instance at fast food places) increase significantly the risk of overweight and obesity in adolescents⁵⁵.

Adolescents who skip meals often consume snacks in reply to hunger instead of consuming a meal. The majority of the adolescents (89%) consume at least one snack a day and report the consumption of two or more snacks a day. Snacks supply more than one third of the calories and added sugars and approximately one fourth of solid fats⁵⁶.

In Italy the part of adolescents that daily consume snacks is equal to 17.4%. There is an inverse association for snack consumption with their mothers' degree of education. Instead regarding the economic resources, excellent conditions involve altogether a reduction of daily snack consumers. Regarding the consumption of fruit and vegetables, 59.5% of boys aged between 11 to 17 and 60.7% of the girls eat up to three portions a day, while only 11.1% and 15.7% eat three or more portions

a day. As for snacks, the virtuous correspondence between parents' high education level and children, boys and girls healthier nourishment behavior is re-proposed. Even for the consumption of soft drinks, which boys and girls often abuse, the 2012 statistics report a relation between the mother's education level¹⁸. In the U.S.A., soft drinks and other beverages with added sugar are commonly consumed and represent 13% of the daily caloric intake⁵⁷.

It is evident that a correlation exists between obesity and overweight in adolescents and the typology of the food market offer/accessibility. If the changes in food offer in the USA^{58,59} are analyzed, they show how:

- the consumption of soft drinks exploded and increased, which is closely correlated with obesity in adolescents;
- the explosion was favored by a massive presence of beverages in the circle of distribution and, particularly, by the advertising campaigns regarding soft drinks, which advertising expenses for food and nourishment in the U.S.A alone doubled⁶⁰ (in the same period of time the advertising expenses for food and nourishment decreased by 20%);
- the increase in consumption of soft and sweetened drinks was accompanied by the increase in food consumed away from home (restaurants, pubs, fast food places), often served in portions that contain higher percentages of nutrients than a normal meal^{61,62}.

To all of this the more and more widespread habit of consuming snacks between meals is associated; the major contribution to the increase of energy intake registered in the U.S.A in the last twenty years seems to be due mostly to snacks rather than the caloric intake during meals⁶³. Still in the U.S.A an additional factor that determined an increase in obesity and overweight in children and adolescents, and more in general in the population, is the decline in average food prices. This caused an increase in purchased and consumed food and an increase in the preference of high caloric density food (snacks, sweets, fries) that, within the average reduction of prices shown, registered the greatest fluctuation and a tendency to cost less than low caloric density food (fruit, vegetables, cereals)^{64,65}.

In many countries of the world the way in which the present food offer developed and formed, has represented a factor of increasing overweight and obesity in children and adolescents, together with factors linked to lifestyles. After studying the food habits of European teenagers, it has emerged, among other things that: in the first adolescence, the caloric intake is nearly similar among boys and girls, while in the second adolescence it is higher in boys. In females, the caloric intake starts to level around the age of 15 and decreases after the age of 18. Males burn more

carbohydrates and fibers compared to females in absolute terms, but the percentage of calories from carbohydrates on the total is almost similar in males and females. The consumption of unsaturated fatty acids is greater in Mediterranean countries, while in center and Eastern Europe the intake of polyunsaturated fatty acids is greater. With the exception of Finland, where the consumption is the highest in Europe, in Northern Europe the lowest intakes of fatty acids are registered. Regarding proteins, the values are similar: between 17% and 19% of the total calories. After 11 years of age, the consumption of alcohol increases in both sexes, although males consume more alcohol than girls⁶⁶.

Concerning excessive energy intake among young people, the attention has to be concentrated particularly on the added fat and sugar intakes in their diet. Especially soft drinks provide 37% of added sugars in the U.S. diet. Added fats are consumed by adolescents largely through snack food, baked good, and fast food. Corn, potato, and other chips have been shown to provide 16% of added fats in the U.S. diet and half of all potatoes are fried potatoes or chips⁶⁷.

Since teenagers spend a lot of time at school and nearby places, *convenience food* (food and beverages that come from vending machines, refectories, stores located inside schools, at fast food places and convenience stores) may have great influence on their food habits⁶⁸. Convenience food tends to be poor in vitamins, minerals and fiber but rich in calories, added fats, sweeteners and sodium⁶⁹.

Nutritional Deficiencies and supplements

It can be generally affirmed that adolescents' nourishment has a tendency to be hypercaloric, too rich in calories and poor in complex carbohydrates, fibers and micronutrients. It would be appropriate to focus particular attention on the intake of iron, calcium and vitamins, nutrients that are needed in greater quantities in this so critical growth period. In the adolescent, the increase of muscle mass and erythrocytes leads to a growing need for iron. In girls, with the beginning of the menstrual period, the martial need is even higher than in boys.

In a study conducted in Italy in the 90's, it was found out that the adolescents' martial deficiency is generally marginal but yet may negatively influence mood, concentration and scholastic achievements, effort endurance. Likewise, the calcium intake must be increased to guarantee an optimum skeletal development, the velocity of bone formation is particularly elevated during the first year of life, during which the skeletal mass doubles and during adolescence, when more than one third of the total skeletal mass of an adult is accumulated⁵².

During the second decade of life, about 40% of the total bone mass is built in a time frame of 3-5 years

under effect of sexual hormones and GH. The greater retention of Calcium (Ca) coincides with a more rapid growth velocity that characterizes puberty. The increase in bone calcium is particularly rapid during puberty when it reaches even 300-400 mg/die, with a peak at 12-14 years old in males and 12-14 years old in females⁷⁰. Likewise, the organism has an effective adaptation to these increased needs with a marked growth in the fractional absorption of this mineral⁷¹. Altogether, in the 9-18 year interval an estimated retention of Ca is equal to 175 mg/die for males and 121 mg/die for females⁷². It is fundamental to reach the "peak of bone mass" in adolescence to reduce the risk of osteoporosis in later years⁷³.

Another issue is about vitamin and mineral supplements: paradoxically the population groups that least use vitamin and mineral supplements are exactly those who, due to environmental and nutritional conditions could have greater benefit from their use. In the American ethnic-social-cultural context they are used mostly by white women's children, majority aged, married, educated, well off people.

It often represents a marker of excessive maternal care, in part conditioned by anxiety and insecurity. The American Academy of Pediatrics, likewise health institutions and other American and European boards of physicians, do not advise extensive and indiscriminate use of vitamin-mineral supplements for the general pediatric population, considering that the habitual consumption of a varied and balance nutritional diet can by itself guarantee an adequate supply of nutrients, in conformity with the levels of recommended intake (RDA, Recommended Dietary Allowances in USA; LARN Recommended Intake Levels Of Nutrients in Italy)⁵².

Besides vitamin and mineral supplements, it is estimated that 29% of American adolescents consume herbal weight loss products⁷⁴. Creatine, guarana energizers, L-carnitine and coenzyme Q10 are other products that are commonly used by adolescents¹.

Energy and nutrient requirements for adolescents

Dietary Reference Intakes (DRI)

Dietary Reference Intakes (DRI) for adolescents must be calculated according to chronological age and sex. Even if the DRIs provide an estimate of the energy and nutrient requirements for adolescents (Tables 1 and 2), the actual requirements vary considerably, because of the differences in body composition, the degree of physical maturity and the level of physical activity⁷⁵.

Proteins

During adolescence, protein requirements vary according to the degree of physical maturation (Table 3).

| Estimated Energy Requirements for Adolescent Males | | | | | | |
|---|------------------|-----------------|----------------|-----------------|-------------|------------------|
| Estimated Energy Requirements (kcal/day) | | | | | | |
| Age | Reference | Reference | Sedentary PAL* | Low Active PAL* | Active PAL* | Very Active PAL* |
| | Weight (kg [lb]) | Height (m [in]) | | | | |
| 9 | 28.6 (63.0) | 1.34 (52.8) | 1505 | 1762 | 2018 | 2334 |
| 10 | 31.9(70.3) | 1.39 (54.7) | 1601 | 1875 | 2149 | 2486 |
| 11 | 35.9 (79.1) | 1.44 (56.7) | 1691 | 1985 | 2279 | 2640 |
| 12 | 40.5 (89.2) | 1.49 (58.7) | 1798 | 2113 | 2428 | 2817 |
| 13 | 45.6 (100.4) | 1.56 (61.4) | 1935 | 2276 | 2618 | 3038 |
| 14 | 51.0 (112.3) | 1.64 (64.6) | 2090 | 2459 | 2829 | 3283 |
| 15 | 56.3 (124) | 1.70 (66.9) | 2223 | 2618 | 3013 | 3499 |
| 16 | 60.9 (134.1) | 1.74(68.5) | 2320 | 2736 | 3152 | 3663 |
| 17 | 64.6 (142.3) | 1.75 (68.9) | 2366 | 2796 | 3226 | 3754 |
| 18 | 67.2 (148) | 1.76 (69.3) | 2383 | 2823 | 3263 | 3804 |

Data from Institute of Medicine, Food and Nutrition Board: Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids, Washington, DC, 2002, National Academies Press.

PAL, Physical activity level.

*PAL categories, which are based on walking per day at 2-4 mph, are as follows: sedentary, no additional activity; low active, 1.5-2.9 miles/day; active, 3-5.8 miles/day; and very active, 7.5-14 miles/day

Table 1 – Estimated Energy Requirement for Adolescent Males (kcal/day) for each activity level based on PALs in function of age, weight and height

| Estimated Energy Requirements for Adolescent Females | | | | | | |
|---|------------------|-----------------|----------------|-----------------|-------------|------------------|
| Estimated Energy Requirements (kcal/day) | | | | | | |
| Age | Reference | Reference | Sedentary PAL* | Low Active PAL* | Active PAL* | Very Active PAL* |
| | Weight (kg [lb]) | Height (m [in]) | | | | |
| 9 | 29.0 (63.9) | 1.33 (52.4) | 1390 | 1635 | 1865 | 2248 |
| 10 | 32.9(72.5) | 1.38 (54.3) | 1470 | 1729 | 1972 | 2376 |
| 11 | 37.2 (81.9) | 1.44 (56.7) | 1538 | 1813 | 2071 | 2500 |
| 12 | 40.5 (89.2) | 1.49 (58.7) | 1798 | 2113 | 2428 | 2817 |
| 13 | 44.6 (91.6) | 1.51 (59.4) | 1617 | 1909 | 2183 | 3640 |
| 14 | 49.4 (108.8) | 1.60 (63) | 1718 | 2036 | 2334 | 3831 |
| 15 | 52.0 (114,5) | 1.62 (63.8) | 1731 | 2057 | 2362 | 2870 |
| 16 | 53.9 (118.7) | 1.63 (64.2) | 1729 | 2059 | 2368 | 2883 |
| 17 | 55.1 (121.4) | 1.63 (64.2) | 1710 | 2042 | 3353 | 2871 |
| 18 | 56.2 (123,8) | 1.63 (64.2) | 1690 | 2024 | 2336 | 2858 |

Data from Institute of Medicine, Food and Nutrition Board: Washington, DC, 2002, National Academies Press.

PAL, Physical activity level.

*PAL categories, which are based on walking per day at 2-4 mph, are as follows: sedentary, no additional activity; low active, 1.5-2.9 miles/day; active, 3-5.8 miles/day; and very active, 7.5-14 miles/day

Table 2 - Estimated Energy Requirement for Adolescent Females (kcal/day) for each activity level based on PALs in function of age, weight and height

Protein: Estimated Average Requirements and Recommended Dietary Allowances for Adolescents

| Age (yr) | EAR (g/kg/day) | RDA (g/kg/day) |
|---------------|----------------|-------------------|
| 9-13 | 0,76 | 0,95 or 34 g/day* |
| 14-18 Males | 0,73 | 0,85 or 52 g/day* |
| 14-18 Females | 0,71 | 0,85 or 46 g/day* |

Data from Institute of Medicine, Food and Nutrition Board: Dietary reference intakes for energy, carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids, Washington, DC, 2002, National Academies Press.

EAR, Estimated average requirement; RDA, recommended dietary allowance.

*Based on average weight for age.

Table 3 - Estimated Average Requirements (g/kg/day) and Recommended Dietary Allowance (g/kg/day) for Adolescents based on average weight for age

The DRIs for protein intake are estimated to allow for adequate pubertal growth and positive nitrogen balance⁷⁶.

Fat

It is recommended that fat intakes do not exceed 30% to 35% of total caloric intake, with no more than 10% of calories coming from saturated fatty acids. Regarding omega 6 and omega 3 fatty acids, the adequate intake should be for polyunsaturated omega 6 fatty acids (linoleic acid) 12g/die for 9-to-13-year-old males, 10g/die for 9-to-13-year-old females, 16g/die for 14-to-18-year-old males and 11g/die for 14-to-18 females. Estimated requirements for polyunsaturated fatty acids (alfa-linoleic acid) among teens are: 1.2 g/die for 9-to-13-year-old males, 1g/die for 9-to-13-year-old females, 1.6 g/die for 14-to-18-year-old males, 1.1 g/die for 14-to-18-year-old females⁷⁶.

Carbohydrates

Carbohydrate requirements in adolescents are estimated to be 130g/die⁷⁶. The requirements for carbohydrates, as for most nutrients, are extrapolated from adult needs and should be used as a starting point for the determination of adolescents' actual needs. Whole grains are the preferred source of carbohydrates because these foods provide vitamins, minerals, and fiber⁷⁷.

Fiber

The adequate intake (AI) values for fiber intake among adolescents are 31 g/die for 9-to-13-year-old males, 38g/die for 14-to-18-year-old males, and 26 g/die for 9-to-18-year-old females. These values are derived from calculations that suggest that an intake of 14g/1000 calories provides optimal protection against cardiovascular diseases (CVD) and cancer⁷⁶.

Conclusions

What has been previously exposed shows that if we simply give the word Food its etymological meaning "all that is eaten and can be eaten" it would be quite restrictive. And then, more correctly: "Food is much more than something to eat".

The word adolescence instead indicates the period that goes from childhood to adulthood but it is above all the period of life that calls us to face important physical and psychological transformations, including wiping away previously acquired good habits.

The adolescent's relationship with food cannot be reduced to a simple calculation of calories or to the separation of more suitable or less suitable food, or still to the imposition of behaviors or habits to which youth seem to be little inclined. The family above all has the task to educate the adolescent in having a healthy relationship with food; lifestyles are learned by being part of a family and consequently healthy nutritional habits are acquired: the family plays an important role in the children's growth, but the same importance must be given to schools, friends, and in general to society.

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Skin Laxity and Striae Distansae: a mini-review

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ABSTRACT

The body *skin laxity* is an aesthetic problem that occurs between the age of 35 and 40 but problems with skin laxity also start to appear in younger people as a consequence of pregnancy or sudden weight loss.

Skin laxity occurs early on the inner arms and legs and on the abdominal area. The impact of these problems on the patient's self-esteem can become important enough to affect quality of life in psychological and in sociocultural terms.

Striae distansae (SD; striae, stretch marks, striae atrophicans) affect skin on the abdomen and the breasts of pregnant women, on the shoulders of body builders, in adolescents undergoing their growth spurt, and in individuals who are overweight.

Striae distansae are most likely to respond to pharmacologic products and clinical interventions at their early stage (striae rubra). Once they become white (striae alba), only few treatment modalities exist and they are quite difficult to treat.

Keywords

Skin, histopathology, striae, treatment

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Skin laxity

The body skin laxity is an aesthetic problem that occurs between the age of 35 and 40 but problems with skin laxity also start to appear in younger people as a consequence of pregnancy or sudden weight loss. Skin laxity occurs early on the inner arms and legs and on the abdominal area. The impact of these problems on the patient's self-esteem can become important enough to affect quality of life in psychological and in sociocultural terms. Particularly, the degenerative changes that occur in aging skin are increasingly understood at both molecular and cellular level, facilitating a deeper understanding of the structural and functional deterioration that these changes produce. A loss of both function and structural stability in skin proceeds unavoidably as individuals age, which is the result of both intrinsic and extrinsic processes, contributing simultaneously to a progressive loss of skin integrity. Intrinsic aging proceeds at a genetically determined pace, primarily caused by the buildup of damaging products of cellular metabolism as well as an increasing biological aging of the cells.

Estrogen levels strongly influence skin integrity in women as well; falling levels in midlife, therefore, produce premature aging as compared with similarly aged men. Extrinsic insults from the environment add to the dermatological signs of aging. The morphological changes of the skin that appear are a consequence of diminished biosynthesis of collagen and elastin and abnormalities of the extracellular environment with a decrease in the concentration of hyaluronic acid^{1,2}.

In aging skin the number of epidermal cell layers remains stable but the skin thins progressively over adult life at an accelerating rate. Thickness decreases about 6.4% per decade on average, with a reduction in epidermal cell numbers. Keratinocytes change shape, becoming shorter and fatter, while corneocytes become bigger as a result of decreased epidermal turnover. Enzymatically active melanocytes decrease at a rate of 8% to 20% per decade, resulting in uneven pigmentation in elderly skin. A reduction of natural water and fat emulsion on the skin is observed, as is water content in the stratum corneum. Changes in the amino acid composition in aged skin may reduce the amount of cutaneous natural moisturizing factor, thereby decreasing its capacity for water binding. Global lipid content of aged skin is reduced as much as 65%.

Dermis thickness decreases with age; thinning is accompanied by a decrease in both vascularity and cellularity. The loss of molecular integrity of the dermis leads to diminished elasticity. In aged skin is observed a flattening of the dermo-epidermal junction by more than a third which occurs as a result of the loss of dermal papillae as well as a reduced interdigitation between layers. This flattening results in less resistance and an increased vulnerability to insult.

The smaller contiguous surface between the two layers also creates a reduced cellular supply of nutrients and oxygen, and an increased risk of dermo-epidermal separation, a process which may be the mechanism by which cutaneous laxity form^{3,4}.

Treatment

The demand for noninvasive skin tightening procedures is increasing as patients seek safe and effective alternatives to aesthetic surgical procedures of face, neck, and body but less invasive approaches are historically associated with inferior efficacy so that surgery still remains the treatment of choice to address moderate to severe tissue laxity.

However, particularly in the last decade, patients are less tolerant of the risks and prolonged recovery associated with surgical options and are seeking treatment that do not interrupt their daily activities. Patients are satisfied with more modest improvement if it is convenient for them and noninvasive.

The difference between results of noninvasive tightening devices and surgery was published by Alexiades et al. who compared fractional radiofrequency (FRF) before and after photographs with face lift before and after photographs.

This revealed a 49% improvement in laxity in surgical group and a 16% improvement in the FRF group.

The FRF achieved 37% of the results of a surgical face lift⁵. Noninvasive skin-tightening devices have become increasingly popular over the last decade to improve skin laxity with minimal risk and recovery time. There are many devices available for tightening including monopolar radiofrequency, bipolar radiofrequency, multipolar radiofrequency, fractional radiofrequency devices, infrared devices, combined light and bipolar radiofrequency devices, and intense focused ultrasound devices⁶.

There have been shortcomings with tightening devices including inconsistent clinical outcomes and a question arises, why are there inconsistent results and variability among patient outcomes? Variability could be related to different devices and mechanism of action, treatment protocols, body area treated, and patient selection. Patient age, degree of laxity, history of smoking, ethnicity, body mass index, and individual patient pain threshold could all possibly contribute to patient response to tightening devices. Literature does not elucidate consistently which variables are the most important in predicting best patient response⁷.

Goldberg and Hornfeldt conducted a study on 31 patients with buttock skin laxity treated with microfocused ultrasound. The right buttock was treated with microfocused ultrasound. Subjects were evaluated for up to 180 days for improvement in overall lifting and tightening of the buttock. Among the subjects evaluated, 89.5% showed improvement. However, when asked, most patients would not

recommend treatment to family or friends. The results of the study showed that microfocused ultrasound clearly can be used to safely lift, tighten, and smooth the buttocks, but better subject selection and newer developed transducers may lead to greater overall acceptance of this technique⁸. Felici et al. investigated the effects of infrared radiation (wavelength from 1100 to 1800 nm) on 303 patients and the treated areas were: face, neck, eyebrows, abdomen, legs and buttocks. The satisfaction degree of patients was: facial, neck and eyebrow lifting “very satisfactory” for 70% of the patients, “satisfactory” for 10%, “unsatisfactory” for 20%; for the other areas it was “very satisfactory” for 40%, “satisfactory” for 20% and “unsatisfactory” for 40%⁹. However, radiofrequency today is the most widely used noninvasive procedure for the treatment of skin laxity for those wishing to avoid recovery time. Unlike laser energy, RF energy does not depend on selective photothermolysis but rather heating of water; therefore any skin type may be treated.

The mechanism of action of RF is based on oscillating electrical current forcing collisions between charged molecules and ions, which are then transformed into heat. RF-generated tissue heating has different biologic and clinical effects, depending on the depth of tissue targeted, the frequency used, and specific cooling of the dermis and epidermis.

The depth of penetration of RF energy is inversely proportional to the frequency¹⁰. The thermal effect is determined by the formula: energy $J = I^2 \times R \times T$ (I =current, R =impedance of the tissue, and T =time of application). Studies indicate that tissue tightening occurs through a mechanism of immediate collagen contraction, supplemented by new collagen synthesis during a long-term wound healing process. Ultrastructural analysis of human tissue immediately after treatment revealed isolated, scattered areas of denatured collagen fibrils with increased diameter and loss of distinct borders. When heated, collagen fibrils will denature and contract, which is believed to lead to the observed tissue tightening. Increased gene collagen expression has also been demonstrated in RF treated human skin. In successful cases, the treatment effectiveness can be immediately perceived and continues to improve during the following 6 to 8 months. A 2-year follow up has shown that the results can last at least 8 to 14 months¹¹.

Striae distensae

Striae distensae (SD; striae, stretch marks, striae atrophicans) affect skin on the abdomen and the breasts of pregnant women, on the shoulders of body builders, in adolescents undergoing their growth spurt, and in individuals who are overweight. Two clinically and histopathologically recognizable forms of SD have been described: striae rubrae and striae

albae. When occurring following pregnancy, the term striae gravidarum refers to the same entity, usually developing after the 24th week of gestation. Hermanns and Piérard described two additional types of SD, “striae nigrae” and “striae caerulea”, which occur in those with darker skin due to increased melanization¹². In adolescents, approximately 40% of male and 70% of female subjects are affected. In adolescent males lower back and knees are usually affected whilst in female subjects thighs and calves are more often involved. During pregnancy, abdomen and breasts are common sites for SD. Geographically disparate studies of SD demonstrate similar micro and macroscopic appearances. Factors leading to the development of striae have not been fully elucidated and three main theories relating to SD formation are described:

1. *Mechanical stretching of the skin,*
2. *Hormonal changes,*
3. *Genetic predisposition.*

Mechanical stretching of the skin is postulated due to the perpendicularity of SD to the direction of the skin. Contradictory studies dispute this theory. While a greater degree of physiological stretching would be expected with increased abdominal girth in pregnancy, the latter shows no significant increase in the frequency of SD (the abdomen is the site of SD involvement in 47% of women). Skin distension may lead to excessive mast cell degranulation with subsequent damage of collagen and elastin.

Release of enzymes by mast cells, including elastases, is proposed as a key initiatory process in SD pathogenesis¹³. Striae distensae are often encountered in states in which hormonal alterations occur. Adrenocorticotrophic hormone and cortisol affect fibroblast activity with increased protein catabolism and thus alterations to collagen and elastin fibres. Increased urinary excretion of corticosteroids (17-ketosteroid) has been reported in patients with SD.

Pregnancy-related hormones are also believed to influence SD formation. Cordeiro et al. described increased oestrogen and androgen receptors in skin exhibiting SD compared with normal skin. Some have suggested that relaxin and estrogen combined with higher levels of cortisol during pregnancy can cause an accumulation of mucopolysaccharides, which increases water absorption of the connective tissue, making it prime for cleavage under mechanical stress^{14,15}.

Genetic factors could certainly play a role, although this is not fully understood. The expression of collagens, elastin, and fibronectin genes is decreased in SD tissue, which could be linked to overall loss of elastic fibers in skin affected by striae^{16,17}. Histological findings have showed thin and flattened epidermis with loss of the rete ridges. At the level of the

papillary dermis, thin and densely packed collagen bundles are arranged in parallel arrays horizontal to the epidermis¹⁸. The atrophic appearance of striae is due to reduced amounts of fibrillin and elastin in the papillary dermis¹⁹.

Treatment

Striae distensae are most likely to respond to pharmacologic products and clinical interventions at their early stage (striae rubra). Once they become white (striae alba), only few treatment modalities exist and they are quite difficult to treat. A number of topical agents have been evaluated and topical application of tretinoin has been shown to significantly improve the clinical appearance of early striae distensae. Tretinoin is thought to work through its affinity for fibroblasts and induction of collagen synthesis. It should not, however, be used in pregnant or breastfeeding females owing to a theoretical concern about its teratogenic effects^{20,21}. A multitude of companies target pregnant women and others affected by SD, with the aim of preventing or treating these cosmetically undesirable lesions²².

Creams, lotions and ointments are used by up to 78% of pregnant women but a Cochrane review undertaken in 2012 evaluated six topical agents in over 800 women and found no statistically significant evidence to support their use in the prevention of SD²³. On the topic many cocoa butter products are marketed and are easily accessible for use in the prevention and treatment of SD and Buchanan et al. evaluated the efficacy of the cream in a double-blind RCT.

A total of 150 women were treated with the cocoa butter and an equal number applied placebo cream daily to all four quadrants of the abdomen. Authors report that there was no significant difference between patients developing SD in the cocoa butter and placebo groups²⁴. Acid-peel treatments such as glycolic acid (GCA) and trichloroacetic acid (TCA) are thought to act by increasing collagen synthesis.

Mazzarello et al. undertook a double-blind RCT of 40 women to assess the effect of 70% GCA topical therapy on SD of the thigh. Patients were divided into two groups: striae albae and striae rubrae. In each group, patients applied the treatment to the left thigh and a placebo to the right thigh with a total of six applications over 6 months. After treatment, the striae rubrae group demonstrated a significant decrease in furrow width and in haemoglobin. The striae albae group demonstrated a similar decrease in furrow width and an increase in melanin. No significant differences were reported in parameters of the placebo-treated areas²⁵.

Nonablative lasers have been utilized in studies on SD including: the 585-nm pulsed-dye laser (PDL), the 1064-nm neodymium-doped YAG (Nd-YAG), the 308-nm xenon chloride (XeCl) excimer laser and the

577-nm copper bromide laser but only few studies evaluating the efficacy of laser therapies in SD are of high level evidence and therefore outcomes need to be interpreted carefully.

The 585-nm PDL is a vascular laser that targets dilated blood vessels in striae rubrae and is reported to increase the collagen content of SD. Untreated SD acted as controls. Outcomes were measured by subjective analysis, shadow profilometry and histopathological analysis. A significant reduction in skin shadowing was reported in patients with SD in all protocols compared with controls. Additionally, elastin regained its normal appearance in SD treated with low-fluence PDL²⁶. The 308-nm XeCl excimer laser is an ultraviolet (UV) laser and has been used to treat SD. Alexiades-Armenakas et al. conducted an RCT of 31 patients with hypopigmented lesions, of which 9 were SD. Lesions were randomized by alternate allocation to receive treatment or not. Treatments were performed at biweekly intervals then fortnightly until either a maximum of 10 treatments were undertaken, or 75% increase in colorimetric measurements relative to baseline or 100% visual pigment correction was obtained. Outcome measures included visually assessed pigment correction relative to control (assessed by three blinded observers) and skin pigmentation levels measured on a colorimeter.

A statistically significant improvement in pigmentation on the colorimetric assessment was identified in treated SD vs. site-matched controls. Improved visual pigmentation level compared with controls was also reported but this declined towards baseline after 6 months²⁷. The non-ablative fractional 1540-nm laser has been shown to improve atrophic scars by increasing the amount of dermal collagen. Light therapy (IPL), radiofrequency devices (RF) and UV radiation therapy also have been used in studies to treat SD²⁸. RF devices increase collagen production by inducing collagen type I mRNA expression. Finally, the ablative laser treatment (10600-nm CO₂ laser), proposed by some authors, presents a high risk of hyperpigmentation, particularly in patients with darker skin and any surgical procedure for the treatment of SD are not widely accepted²⁹.

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Courses and Congresses

2016

January – Caracas (Venezuela)

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16 hours of University Credits

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Spanish Society of Aesthetic Medicine

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Web: www.seme.org

E-mail: secretaria@seme.org

3-5 March – Mexico City (Mexico)

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XIII Mexican Congress of Aesthetic and Anti-Aging Medicine

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26th Argentinian Congress of Aesthetic Medicine

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The 10th Aesthetic Medicine Congress of South Africa

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Venue: CSIR Convention Centre

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French Association of Morpho-Aesthetic and Anti-Aging Medicine

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2017

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9th National Congress of Aesthetic Medicine and Plastic Surgery

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