Minimally-invasive and Non-invasive Facial Rejuvenation Techniques (Lifts)

by Dr. Michel E. Pfulg
Definition
Aging is a global process that affects all layers of the skin. It is a normal process that might be different in each patient, is genetically determined (chronoaging), and has to be accepted by everyone as something natural. With aging, the skin suffers dermal disorganization, atrophy of its components, and loss of the dermo-epidermal papillae making the tissue weaker and less firm. A facelift addresses the ptosis and sagginess of the facial tissues. It has no effect on the quality of the facial skin itself. Therefore, a facelift is not a treatment for wrinkles, age spots or creases which are better treated with rejuvenation procedures and/or skincare products. Non-invasive or minimally-invasive treatments have little influence on the ptosis of the tissues, but their mild retightening effects are probably the reason why the term “facial lift” is now also used for such non-invasive techniques. Marketing issues are another reason why such a word – facelift – is now used for such non-aggressive procedures. Depending on the penetration or non-penetration of the epidermis, we use the term “minimally-invasive” or “non-invasive”.

Before delving into the different minimally-invasive and non-invasive techniques used today to address the aging skin of the face, we will try to define exactly which term should be used for each one of the techniques applied.

Facelifts
The term “facelift”, in my opinion, should be reserved for the invasive surgical facial lifting treatments, which are always aggressive and address the ptosis of the face. Face-lifting, or rhytidectomy, was first performed in the early 1900s and today involves skin undermining with or without smas undermining, with or without sub-periosteal undermining, plus skin excision. A revolution occurred in the 1970s when Skoog described the dissection of the face in continuity with the platysma in the neck. Since then, the procedure has become very popular among our patients. In the years 1970-2000, multiple techniques were described. Nowadays, a facelift can be cervico-facial, addressing the lower two-thirds of the face. It can also be total when a brow lift is included in the dissection. A mid-face lift addresses mainly the middle third of the face and can be sub-periosteal or sub-cutaneous. A mini-lift refers to a short scar technique; it can be a Soft-lift, an S-lift, or a MACS-lift. An endoscopic facelift addresses the upper and/or mid-face. All these techniques are surgical and each one has its own indications and drawbacks. We will let the reader search for details of each technique in the literature.

Minimally-invasive Facial Rejuvenation Procedures
A rejuvenation procedure is minimally-invasive when it penetrates the epidermis, whether with a scalpel or a needle.

An optimal rejuvenation program should try to correct all the signs of aging to “bring the patients back to their real age...or even five to ten years back” but without changing their personal and differential “characteristics”. A non-surgical, minimally-invasive technique is much less traumatic than a rhytidectomy, and tends to have a mild lifting effect of the facial tissues. However, the long-term results cannot be compared with those of a surgical lift. Those techniques address young patients with discreet laxity, borderline patients who do not want or cannot be submitted to an invasive surgical facelift.

Rejuvenation treatments with fillers
Fillers are used in the face to address atrophy, dryness, loss of volume, wrinkles and depressions. Their filling effect gives the face a fresher and more harmonious appearance.

Absorbable materials (temporary)
Collagen: Collagen is a natural protein that gives the tissue elasticity. The effects of collagen fillers generally last for three to four months. Collagen can be extracted from human, porcine or bovine material. Hyaluronic acid: Hyaluronic acid is a polysaccharide present in skin and cartilage, a natural substance that absorbs water and thus, helps maintain the “hydration” level of the skin. This further helps maintain the structure of the skin. This acid is sourced from bacteria or rooster combs (avian), and can be modified with cross linking technique to give the molecule a longer lasting effect. The effects of this material last approximately six to 12 months.
Calcium hydroxyapatite: Calcium hydroxyapatite is a mineral that is found in human teeth and bones. The calcium hydroxyapatite particles are suspended in a gel which can be injected to restore lost volume, correct deep lines or wrinkles, and retighten the skin. The effects of this material last approximately 18 months.4

Poly-L-lactic acid (PLLA): PLLA is a biodegradable, biocompatible “fibrosing agent”. That means that once injected, it acts by stimulating the production of collagen by fibroblasts. The effects may last up to two years.4

Partially absorbable materials
Lipofilling, also referred to as free fat transfer or fat grafting, is a procedure to fill up facial features with your own body fat instead of using a chemical filler or an implant. This is a highly efficient procedure as it is minimally-invasive and produces natural results. About 70% of the fat stays forever.5

Non-absorbable materials (permanent)
Such materials are no longer in use because of their high rates of complications.

Rejuvenation treatments with threads
Thread lifts are procedures that use resorbable, partially resorbable or non-resorbable threads to lift facial tissues through a puncture with a needle, or a small incision. These threads can be free floating, cogged or barbed threads, each one with different devices to stabilize the tissues.6 Manufacturers have invented various names to market their products (e.g. Silhouette Lift, Aptos Lift, etc.).

Facial rejuvenation with botulinum toxin
Botulinum toxin A is produced by Clostridium botulinum, a gram-positive anaerobic bacterium that reduces or even blocks the activity of the muscles. When used in the face, it decreases dynamic wrinkles as well as static ones. Too aggressive treatments might cause excessive muscle relaxation or palsy that turns the face inexpressive. Thus, a very low dose of this toxin will be selectively injected into target muscles (around the eyes for crow’s feet, on the forehead for forehead wrinkles and on the glabella for glabellar lines). It lasts for about four to six months.7 When rejuvenating the face, a combination of botulinum toxin with fillers is referred to by some as a “softlift”, leading to confusion with the surgical Soft-Lifting invasive technique.

PRP (platelet-rich plasma) is created when blood from a vein is placed in a special centrifuge to concentrate the platelets (usually three to five times their normal concentration). The platelets are isolated together with growth factors from the patient’s blood. When these growth factors enter the face (injected by the physician), multi-potent stem cells become activated to grow new tissue.
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**Skin rejuvenation with microneedling**
Skin microneedling is a procedure that uses dozens or as many as 200 needles with a limit of penetration up to 1.5mm, creating a channel or micro-wounds. These micro-injuries stimulate collagen and elastin production in the papillary dermis, and the neovascularization improves the quality of the skin.8,9,10

**Vampire lift**
This term has been chosen for commercial interests. However, it should be named “platelet self-transfusion rejuvenation”. PRP (platelet-rich plasma) is created when blood from a vein is placed in a special centrifuge to concentrate the platelets (usually three to five times their normal concentration). The platelets are isolated together with growth factors from the patient’s blood. When these growth factors enter the face (injected by the physician), multi-potent stem cells become activated to grow new tissue. This new tissue includes new collagen, new fatty tissue (for smoothness), and new blood vessels (for a healthy glow).

**Non-invasive Facial Rejuvenation Procedures**
A rejuvenation procedure is non-invasive when it does not penetrate the epidermis. Non-invasive facial procedures are tension inducers that fight against the laxity of the tissues of the face. Different options are available. The non-invasive procedures can be ablative and non-ablative and are sometimes referred to as “scarless facelifts”.

**Ablative procedures**
Ablative resurfacing is a skin procedure that causes injury and consequently, stimulates healing and the growth of new skin. These methods include chemical peeling, dermabrasion, and laser resurfacing.11,12

**Chemical peels**
There are three types of peels: superficial, medium and deep. These have varying percentages of active ingredients and different pH levels. Superficial/light peels are usually made from alpha hydroxy or beta hydroxy acids, known as AHAs and BHAs, and include glycolic acid, lactic acid and salicylic acid. Nowadays, it is also common to use fruit enzymes and acids from natural sources such as pumpkins, cranberries and pineapples. Medium depth peels derived from TCA (trichloroacetic acid) penetrate deeper into the skin and can be used to treat sun damage, pigmentation and wrinkles. Deep peels usually use carboxic acid (phenol peels) or high strength TCA to penetrate the deeper layers, or dermal layers, of the skin.

**Mechanical abrasion**
Dermabrasion is a type of surgical skin planing performed in a professional medical setting. Mechanical abrasion involves the controlled deeper abrasion of the upper to mid layers of the skin with any variety of strong abrasive devices including a wire brush, diamond wheel or fraise, sterilized sandpaper, salt crystals, or other mechanical means.

**Lasers**
The use of ablative lasers for facial resurfacing began in the early 2000s. The lasers provide dermal heating causing collagen denaturation and then remodeling.13 It heats the water of the skin up to a point where it is vaporized. It induces a controlled but superficial burn of the entire skin surface.

Non-fractionated lasers, less used nowadays, are more aggressive and act in the whole area, increasing the risk of infection and causing a longer recovery period.
Fractionated lasers create pulses that are deeper than they are wide, creating “micro thermal zones” of heated tissue surrounded by intact epidermis and dermis to provide structure and nutritional support during the recovery phase. The devices vary in intensity, shape and area treated.\textsuperscript{14}

Non-ablative procedures
Non-ablative resurfacing is a procedure that provides collagen modulation by breaking upon heating the weak hydrogen bonds, leading to a random coil configuration of the alpha-chains and subsequent shortening and thickening.\textsuperscript{15,16,17} There are different types of non-ablative procedures:

Intense pulsed light sources (IPL)
IPL devices are able to activate the production of new collagen and subsequent dermal remodeling for up to six months following the treatment, achieving overall photo rejuvenation with a significant clinical improvement in rhytides, skin texture, and pore size.\textsuperscript{15,16,18} In addition, IPL increases epidermal thickness, and induces an improvement in pore size and skin tone.

Mid-infrared lasers
These devices act by shortening and thickening the collagen fibrils, followed by fibroblast proliferation and deposition of new collagen types I and III. They improve all aspects of photo-aged skin. However, full clinical impact may not always be apparent for up to four to six months following a series of treatments.\textsuperscript{19,20,21}

Fractional non-ablative infrared lasers
The concept of using fractional non-ablative photothermolysis was developed by Manstein et al in 2004, to attempt to get good results without the associated risks and lengthy recovery period seen with their ablative counterparts.\textsuperscript{22} The stratum corneum remains intact during and after laser firing. The re-epithelialization is performed by keratinocyte migration and division of transient amplifying cells into the treatment column. After two to three days, the tops of the wounded areas are shed as microscopic epidermal and dermal necrotic debris (MENDs).\textsuperscript{19,23}

Radiofrequency technology (RF)
RF devices rely on the production of heat within the treated tissue.\textsuperscript{24,25} The energy delivered is directly proportional to the product of the square of the current, the impedance, and the time of application (Ohm’s law).\textsuperscript{26,27} These devices establish an electromagnetic field within the treated tissue, resulting in the movement of charged particles directed from one pole or electrode to the other. The tissue tightening elicited by RF devices has two phases, immediate (collagen contraction response to thermal injury) and delayed (collagen remodeling – gradual skin tightening occurring over several weeks to four to six months).\textsuperscript{28} Over the last ten years, several devices have been developed: monopolar RF and bipolar RF.\textsuperscript{29}

Electro-optical synergy (ELOS)
ELOS is a new concept that combines light energy in the form of a laser, such as the diode laser, intense pulsed light, or a broadband infrared light, together with radiofrequency energy, to impart changes in dermal collagen and effect skin tightening. These devices act by increasing the levels of tropoelastin and synthesizing collagen.\textsuperscript{30}

Microfocused ultrasound
Microfocused ultrasound devices work by causing a discreet focal heating of the dermis and stimulate neocollagenesis and elastin remodeling. They reduce wrinkles and skin sagginess with minimal downtime, discomfort, and risk of adverse events.\textsuperscript{31,32} Unfortunately the manufacturer markets his device as “The non-surgical way to lift your facial skin”!

Conclusion
An optimal rejuvenation program should correct all the signs of aging. Our patients should look better, and one should not be able to identify what treatment our patients underwent. To achieve such results, we might perform aggressive or minimally- or non-invasive procedures, depending on the stage of the aging process. With regards to non-invasive facial treatments, we believe that the word rejuvenation and not the word “lifting” should be used to describe non-aggressive techniques. In no way can a minimally- or a non-invasive technique replace a surgical lift when the indication is given for an aggressive intervention. Therefore terms like softlifting, scarless lifting, vampire lifting, mini-lifting, silhouette lifting, etc. should be avoided when talking about non-invasive techniques. Nevertheless, all these techniques are complementary, the final goal being the satisfaction of our patients and aesthetically pleasing natural results.\textsuperscript{a}}
Dr. Michel Pfulg is the founder and medical director of Laclinic-Montreux, Switzerland. Dr. Pfulg was appointed Consultant Plastic Surgeon at the Cantonal Hospital of Fribourg (Switzerland) in 1984. In 1988 he became Head of the Department of Aesthetic Surgery at Clinique Valmont, located above Montreux, Switzerland. From 1992 to 1999, he practiced his art as Consultant Plastic Surgeon at Clinique La Prairie, in Clarens-Montreux. In 1999 he turned his attention to creating his own clinic, entirely devoted to beauty, in Montreux-Territet on the shores of Lake Geneva. Inaugurated in May 2002, Laclinic-Montreux rapidly became a renowned medical establishment, among the most exclusive and successful in the world. In May 2014 the exclusive clinic “The Beauty Suite by Laclinic-Montreux” was opened in Lausanne, Switzerland. Dr. Pfulg has published many scientific papers and is a member of the scientific board of Helena Rubinstein (L’Oréal) with whom he developed a cosmeceutical line called “Re-Plasty” in 2008. He is a member of the Swiss Medical Society, the Swiss Society of Plastic, Reconstructive and Aesthetic Surgery, the Swiss Society of Aesthetic Medicine (President in 2004), the International Society for Aesthetic Plastic Surgery and the International Confederation of Plastic and Reconstructive Surgeons.

Images of patients are courtesy of Dr Michel Pfulg, Dr Serge Le Hua, Dr Marco Cerrano and Dr Antonio Campo of Laclinic-Montreux, Switzerland.