

body

# cellulite breakthrough

ELOS Technology for  
Cellulite and Fat treatment:  
Combination of Conducted  
RF, Infrared and Vacuum  
Case Report by  
**James Shoual MD.**

Cellulite is a skin condition that appears as an irregularity of skin contour, often characterised by a dimpled appearance of the skin (popularly know as 'orange peel' or 'cottage cheese' skin). This unsightly condition tends to gather around the thighs, hips and buttocks of women. Cellulite affects 80 per cent of women worldwide and is usually considered more of an aesthetic problem, particularly for those who have a low percentage of body fat.

Cellulite develops in the body when fat is deposited immediately below the dermis and contained in fat chambers that can become

swollen. As the fat cells grow in size, surrounding tissue becomes compressed and hardened, making blood circulation more difficult and trapping fluids. This causes reduced elasticity of the adipose tissue, producing an undesirable tension between the layers. The resulting depression of connective tissue anchor points creates the appearance of cellulite. Such irregularities respond with varying results to invasive procedures such as liposuction. The non-invasive technologies such as massagers and external ultrasound show marginal results after series of 15-20 sessions.

This paper presents preliminary results from the Vela Smooth by Syneron Medical, which utilises a unique combination of infrared light, conducted RF energy and vacuum. I believe that the Vela may provide an alternative form of therapy for problems of skin contour.

### Vela technology

The applicator of the Vela Smooth contains a controlled wavelength light energy source in the infrared range providing external heating of the tissue. Conducted RF energy, coupled with a unique orientation of electrodes, is designed to deliver energy to a depth of approximately 15mm. The Vela Smooth simultaneously affects skin irregularities via a mechanical disruption and delivers energy deep into the tissue. The combined energy penetrates approximately 3-15mm beneath the skin surface causing heating of the subcutaneous fat. This combined mechanical and infrared/RF energy treatment has been designed to increase metabolism of adipose tissue homogenising subdermal fat and increasing skin elasticity. It was theorised that this treatment would result in a marked improvement of the skin contour.

### Study protocol and results

Fifteen (15) female patients enrolled in this clinical study with a variety of body fat and cellulite conditions. Patients in the group ranged from 25 to 64 years old, with skin types II-IV. Documentation of treatment results included before and after pictures with blinded evaluation, as well as circumference measurements of the hips and thighs before the first treatment and after the eighth. All patients received eight treatments at twice-weekly intervals. Each treatment session lasted 40 minutes.

Initial tissue reaction when treating with the Vela Smooth is an increase in local blood supply to the adipose tissue. This is caused by a combination of negative pressure and the heating effect with the infrared and the radio frequency energy sources.

All patients demonstrated improvement in cellulite appearance as well as reduction in the hip circumference. Average improvement for all patients on the appearance of

cellulite was 65 per cent. Hip perimeters were reduced 3.2cm on average, and all patients reported feeling skin contraction as a result of the treatment. No complications were noted and there was no discomfort during and after the treatment. Indeed most of the patients enjoyed the treatments. In Figure 1 we can see a 35-year-old female with dramatic improvement in the appearance of cellulite over the hips.

### Discussion

The clinical reaction created by the Vela Smooth is a temperature increase in the tissue deep down to the fat layer. The speed at which fat can be metabolised depends on temperature according to the Arrhenius law:  $Y = Ae^{-B/T}$  where  $Y$  is the yield of metabolic reaction,  $A$  and  $B$  are constants, and  $T$  is the temperature (in degrees Kelvin).

Figure 1



From the Arrhenius equation we can see exponential dependent of the reaction rate on tissue temperature.

The heating also increases molecular diffusion inside the tissue, thus increasing local substance exchange that enhances fat metabolism. The Vela Smooth combined infrared light and conducted radio frequency energy (RF) sources deliver a sufficient quantity of deep heat without any superficial damage. Additionally the Vela Smooth's mechanical action physically breaks fat cells clusters and stretches the fibrous bonds. Mechanical action also enhances lymphatic drainage, stimulating the evacuation of fat decay products. The Vela Smooth is designed to shape the skin surface for optimal delivery of conducted RF energy to the adipose tissue.

### Conclusion

This preliminary study demonstrates promising results. An unequivocal smoothing of the skin surface was observed. There was no compromise in the normal activity of the patients during the study period allowing the collection of objective treatment data. Long term follow up of patients is pending. **acsm**

# elos advantage

**Hidemi Akai MD, PhD**, from Akai Medical Clinic in Tokyo, Japan, reports on his research findings on the use of Electro Optical Synergy (ELOS) for aesthetic medicine, specifically in wrinkle reduction and skin tightening with the Polaris WR.

## **Introduction**

Clinical signs of ageing include the appearance of wrinkles and loss of skin laxity, increased visible vascularity and pigmented spots. The desire to reverse the process has been a key motivator behind the rapidly growing anti-ageing industry. There are a multitude of technologies to address the different problems faced with ageing, each technology differing depending on the type and degree of the problem encountered. Improving skin texture and removing wrinkles to produce smoother skin traditionally

required invasive surgical procedures like facelifting or ablative techniques such as laser resurfacing and chemical peeling. However, patients have avoided such modalities because of prolonged downtime and the high risk of dischromia.

Several non-ablative devices are now available in the market to address the problem of skin texture and wrinkling. Collagen remodelling is based on generating new fibres in the dermis that gives the skin back elasticity, enhances the skin appearance and removes wrinkles. The trigger for new collagen formation is heating of the dermis and collagen fibres to a sub-necrotic level. Basic technologies for this treatment use light absorption by water in the dermis layer in order to heat the collagen fibres. Simultaneous cooling of the skin surface helps to prevent epidermal injury and reduce the pain involved with the procedure. Currently, the most popular products in this group are the 1.32m Nd:YAG and 1.440m diode lasers. The main limitation though of these devices is that multiple treatments are required and wrinkle reduction is minimal compared to the ablative techniques.

The second group of devices is based on creating perivascular inflammation and revascularisation, thus increasing blood supply to the treated area and resultant change in skin metabolism. Examples of this technology are the pulsed dye and 1064nm Nd:YAG lasers. Promising results with this technology have been shown with peri-orbital and peri-oral wrinkle reduction. However, the shallow penetration depth limits the treatment effect of the pulsed dye laser, which is about 0.5mm. The 1064nm Nd:YAG laser has a greater penetration depth, of about 4mm, but absorption of this light energy by haemoglobin is

**‘Collagen remodelling is based on generating new fibres in the dermis that gives the skin back elasticity, enhances the skin appearance and removes wrinkles’**

not high. Thus, while such therapies address some of the issues with non-ablative therapy, other options maybe more efficacious.

Lately a new approach to non-ablative facial treatment has been developed: the use of uni-polar Radio Frequency (RF). RF current generates heat in the dermis layer according to the electrical properties of the tissue. By using RF energy, heat can be generated in the tissue that is transparent for light-based treatment. RF as a means for wrinkle reduction as well as skin tightening has been demonstrated.

This case report presents preliminary results from the Polaris WR by Syneron Medical Ltd, which utilises ELOS (Electro-Optical Synergy). ELOS technology is a combination of high power 900nm diode laser with conducted Bi-Polar RF current. This technology may afford patients with greater wrinkle reduction and skin smoothing

than current non-ablative devices, yet without the extended recovery process of ablative techniques.

### Polaris WR technology

The Polaris WR is a device that combines two forms of energies – laser light energy (optical) and conducted radio-frequency (RF) energy, simultaneously applied to the tissue. The RF energy penetrates into the skin and causes heating of the deeper tissue with neo-collagen formation while the laser energy will be synergistic with this effect and also address the more superficial problems of skin tone and pore size reduction. Conceptually, the two energy sources will provide greater wrinkle reduction and tightening without epidermal injury.

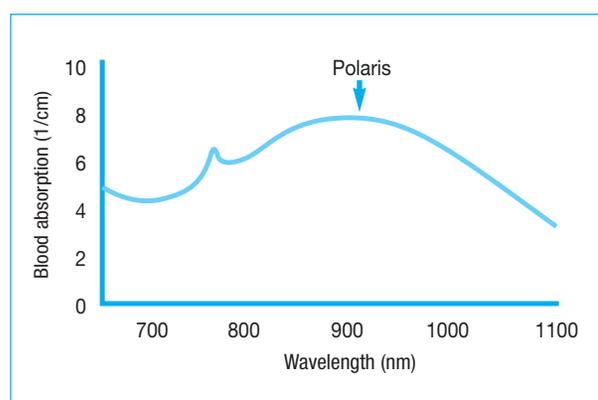


Figure 1: Light absorption by haemoglobin as a function of wavelength

**Optical properties of the Polaris WR** Optical energy is produced by diode generated laser light at 900nm. This wavelength corresponds to the peak of haemoglobin absorption and has a penetration depth of more than 2mm. Light absorption by the haemoglobin is shown in Figure 1. Optical energy density can go as high as 50 J/cm<sup>2</sup> with pulse duration as long as 200msec.

**Conducted RF properties of the Polaris WR** The Polaris WR can generate an RF energy level as high as 100 J/cm<sup>3</sup> with a pulse duration up to 100msec. Conducted RF is delivered to the skin by a bipolar system that provides a penetration depth of approximately 2-3mm.

The handpiece is designed to optimise the temperature distribution so that there is maximal effect in the deep dermis. Other parameters of the delivery system that are controlled include cooling and pulse duration to facilitate the treatment of all skin types with the same efficiency.

It is known that due to high scattering, the maximal effect of laser fluence is on the skin surface at the area of contact between the handpiece and skin. Maximal RF current is also in the area of the skin between the two contacting electrodes. The design of the Polaris WR handpiece creates an overlap of these two forms of energy inside the tissue at depths of 2mm, while on the skin surface, the energies are separated spatially. In addition, contact cooling pre-cools the skin and assures safe and less painful treatment. Figure 2 shows in-vitro studies: the

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clinical effect of Polaris WR on tissue shows maximal tissue damaged depth of 2mm causing matrix coagulation of deep dermis with RF and selective thermolysis of blood vessel with the 900nm diode laser.



Figure 2: In-vitro test result of the Polaris WR on chicken tissue

## Study protocol and results

Seventy-seven (77) patients were treated with the Polaris WR for the following clinical indications: laugh line (nasolabial fold), enlarged pore, wrinkle on the lower eyelids and skin tightening. Patients received 3-5 treatment sessions, with the entire face treated in each session with 2-3 passes. Results were monitored by the Robo Skin Analyzer model RSA-50 (manufactured by Inforward Inc, Tokyo, Japan), which is a state-of-the-art 3D facial imaging system measuring various skin surface conditions by digital photography taken on a fixed platform. This 3D system measures skin surface colour and structure such as wrinkles, pigmentation, skin tone and pores, and gives various quantitative and qualitative data through its imaging analysis software.

Table 1 summarised the results as received from the Robo skin analyzer.

	Nasolabial fold	Enlarged pore	Wrinkle on lower eyelid	Eyebrow position
Rate of improvement %	100	100	93	65
Degree of improvement	69.3%	57.5%	63.0%	3.2mm

Table 1

From Table 1 we can see that all patients had improvement in the nasolabial fold, and the number of enlarged pores. The average improvement is 69.3% and 57.5% respectively. Average eyebrow position was lifted by 3.2mm in 65% of the patients. Wrinkle reduction on lower

eyelid by 63% was observed for 93% of the patients.

Figure 3 shows a dramatic improvement in the appearance of the nasolabial fold on 35-year-old female followed 5 Polaris WR treatments. RF energy of 80 J/cm<sup>3</sup> and 26 J/cm<sup>2</sup> of laser fluence were used. Skin texture as well as pigmentation also improved.

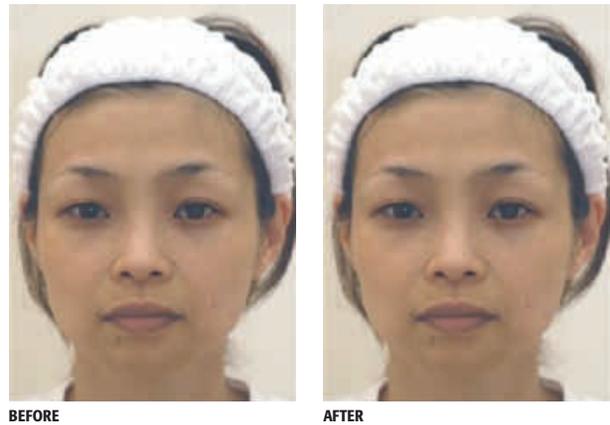


Figure 3: Before and after Polaris WR treatment

Figure 4 presents skin tightening on a 40-year-old female with almost no wrinkles. The lifting effect can be clearly seen around the cheekbones. The entire skin over the face is tighter and the patient looks as if she lost some weight.



Figure 4: 40-year-old female before and one month after three Polaris WR treatments

## Conclusion

Electro Optical Synergy (ELOS) as implemented in the Polaris WR, combining diode laser (900nm), conducted RF energy and contact cooling, offers a new approach to facial treatments that enjoy the efficacy of ablative techniques but with the safety and no downtime of the traditional non-ablative technologies. **acsm**



# skin **rejuvenation** with **IPL**

Adelaide plastic and reconstructive surgeon **Dr Tony Moore** explains the advantages of the Syneron Aurora device for facial rejuvenation. Lise Petersen reports.

**F**rom the time of antiquity people have been looking for the fountain of youth – pouring lotions, oils and balms onto their skin in their search for some form of facial rejuvenation,” says Adelaide plastic and reconstructive surgeon Dr Tony Moore.

Ageing of the face, either on a superficial or a deep plane, occurs when there is a loss of elasticity in the underlying connecting structures. “That’s when you start to have the brow descending, deepening of the nasolabial folds, and of the jowls and neck,” he says. “The best form of rejuvenation is still to perform a repositioning

procedure such as a browlift or facelift. However, this involves a considerable amount of downtime, invasive surgery, increased costs, and risks and complications need to be taken into consideration. Therefore there is always a place for a simpler form of rejuvenation.”

It is, however, certainly possible to successfully treat the texture and surface of the skin to give a more rejuvenated appearance to the face.

“For about the last 15 years we’ve used laser resurfacing, which is effective for skin rejuvenation,” explains Dr Moore.

The disadvantage with laser resurfacing is that it requires severe social downtime. “You have a face that

‘The Syneron Aurora device works though a combination of two modalities: radiofrequency and an intense pulsed light source’

takes seven to 10 days to heal, and then it can remain pink for months or even longer,” says Dr Moore.

So doctors are still searching for better means of rejuvenation. “For the last four to five years now we’ve been looking at lasers or light sources that will not target the surface of the skin but rather work deeper down,” he says.

“We are trying to induce some tightening, or scarring, underneath the skin’s surface so it will, in turn, create tightening of the skin. We observed this most significantly with people who had multiple treatments for facial port-wine stains. Generally the texture of their skin improved and was tightened. So therefore laser manufacturers have looked for the right parameters to maximise those effects.”

The Syneron Aurora device works though a combination of two modalities: radiofrequency to preheat the tissue and an intense pulsed light source with selected wavelengths to penetrate deeper into the skin’s surface and cause subdermal skin tightening. This process is called photorejuvenation.

“An added advantage is that the wavelengths of light are also able to target the surface pigmentation that is often seen with sun damage, called sun

spots, and smaller broken capillaries, both of which are telltale signs of age and a youth spent in the sun,” says Dr Moore.

With the Aurora, patients can expect between four and six treatments, each treatment lasting approximately half an hour, every two to four weeks.

“Patients shouldn’t expect to come out with alabaster smooth skin,” he explains. “However, the Aurora does give significant improvement to the skin and patients don’t need to limit themselves to six treatments. On a recent trip to Japan, where the Aurora has been used for a longer period of time, I saw an increasing number of women using it for maintenance, even coming in four to six times a year.”

Patients need to check that the operator of any laser or IPL machine is experienced or is at least under the supervision of an experienced clinician. “Anyone can point and shoot but it is the knowledge of the skin and the knowledge of the interaction of the appliance and the skin that is most important,” he explains.

With the right parameters set on the Aurora, there are an almost infinite variety of options available to target different aspects of the skin. For example, by changing the handpiece, and changing the wavelength spectrum and the parameters of light and radiofrequency, the machine doubles as an effective hair removal device.

Dr Moore explains that there are three main components to facial rejuvenation: targeting the increased pigment in the skin, abnormal blood vessels (whatever their origin) and tightening of the deep surface of the skin. “All of these come under the classification of photorejuvenation,” he says. “It is fair to say that we have not yet found the fountain of youth, although the Aurora process is bringing us closer to it.” **acsm**



BEFORE



AFTER treatment with Syneron Aurora device