RF and Pulsed Magnetic Fields; Achieving and Maintaining Consistent Temperature In-Vivo

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Since the first uses of cosmetic radio frequency (RF), devices have proven the efficacy of this energy when treating rhytides, laxity, focal fat and cellulite. Inconsistencies in temperature and maintaining goal therapeutic temperatures have proven to be the main challenge with traditional radio frequency devices. Pulsed Magnetic Fields (PMF) have proven to accelerate angiogenesis, heal cutaneous wounds, decrease post-surgical pain, reduce edema, negatively influence bacterial and tumour cell growth and repair both bone and nerves, but little has been known of its application in cosmetic medicine until now. . The blending of these two energies has produced a synergistic thermal and non-thermal action inducing long term collagen remodelling and adipose tissue reshaping. Venus Freeze is the first device to deliver a unique algorithm of multi pole RF, allowing the maximum amount of energy to be released while the patient experiences no discomfort due to this deep heating matrix. Each electrode has the potential to be both positive and negative and the rotational system allowing this change to occur one million times per second allows for the treatment to be comfortable and tolerable for patients. The non-thermal PMF energy is emitted simultaneously and continuously throughout the treatment.

Therapeutic threshold is defined as 39 to 41 degrees centigrade on the face or neck and 42 to 45 degrees centigrade on the body. When the tissue is heated to the proposed therapeutic temperature this increases fat cell metabolism and accelerated triglycerides egress from the cell. Increased tissue temperature increases vascular perfusion, which further enhances lipid turnover.[1] Reduction of the convex distension is also partly due to shrinkage of the tissue. Immediate collagen contraction is achieved by the denaturisation of the collagen fibril which subsequently leads to neocollagenesis. The new collagen produces tighter tissue leading to more appreciable measurements.

With the Venus Freeze we have reached the ideal external (epidermal) temperature of 41-43°C, and a sub dermal temperature of 45 - 47°C required for optimal skin tightening. It is possible that the non invasive Venus Freeze can externally achieve the same temperatures as its predeceasing and more invasive energy assisted counterparts.[2]

METHOD

Three patients were selected to participate (women between the ages of 30 – 50 with skin type II

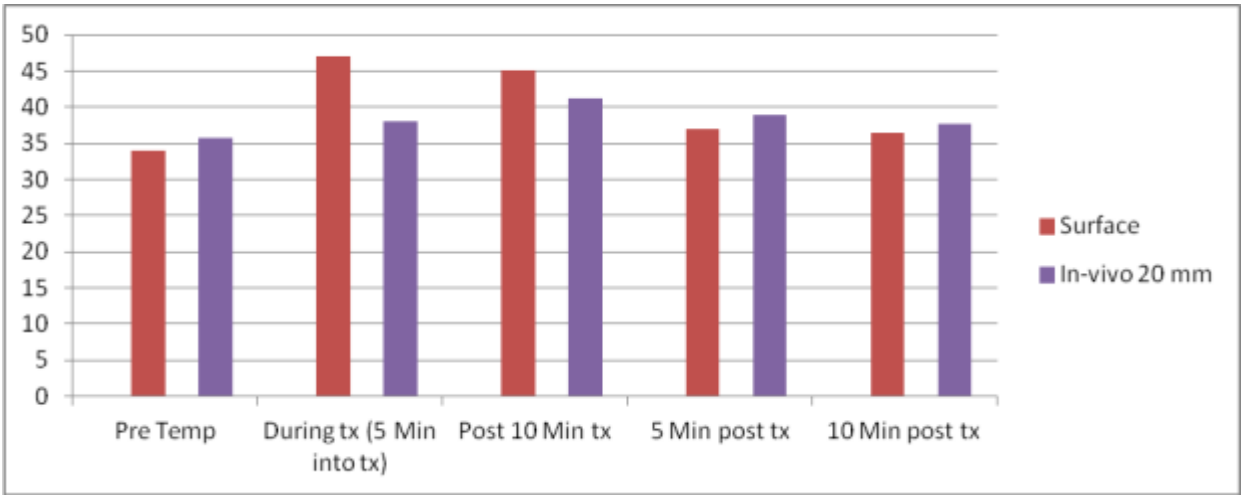
would undergo a Venus Freeze 10 minutes treatment to the abdomen prior to their abdomenoplasty or liposuction surgery. Internal and external temperature was monitored throughout and recorded at set intervals; before the treatment, after 5 minutes during treatment, 5 minutes post treatment and 10 minutes post treatment. The depth of internal monitoring was 20mm. Once the patient is under general anesthetic the abdomen program was selected with the preset values being 80% RF, continuous PEMF and the Octipolar hand piece. The treatment area was cleansed and glycerine was applied. The Octipolar applicator was applied to the skin and treatment commenced using irregular movement s on the skin to cover the area homogenously with heat. After 1 minute the device was placed on pause and the temperature on the surface of the skin was taken using a Fluke 62 mini IR thermometer and the information is recorded. The treatment is then resumed for 4 more minutes. After 4 more minutes the device is placed on pause and the external temperate and the internal temperature were measured using the Fluke Digital Thermometer for the external temperature and the Thermalert TH-8 monitoring thermometer with an MT-23/3 hypodermic needle microprobe at 20 mm depth. The treatment would resume for another 5 minutes. Once the last 5 minutes was complete the temperature was taken again in the same fashion with the same devices at the same depth. After 5 minutes and 10 minutes post treatment, the same temperatures were taken and recorded using the same devices and same depth.

RESULTS

The patients had consistent heating on the surface with no negative responses such as burns, blisters or bruises. All patients reached therapeutic temperature in the first minute of treatment. All patients were able to achieve and maintain higher internal temperatures for the duration of the study which was 10 minutes post treatment. Each of the participants was able to maintain higher therapeutic internal temperatures in comparison to the external temperatures at 5 and 10 minutes post treatment. (see charts)

SUMMARY

While RF and PEMF are both energies which have a achieved success in the area of focal fat, collagen regeneration and tissue tightening, it has been challenging to deliver them with consistency and without pain. The Venus Freeze multipolar system delivers consistent and homogenous heating. This extensive heating effect will aid in achieving reliable and predictable results.



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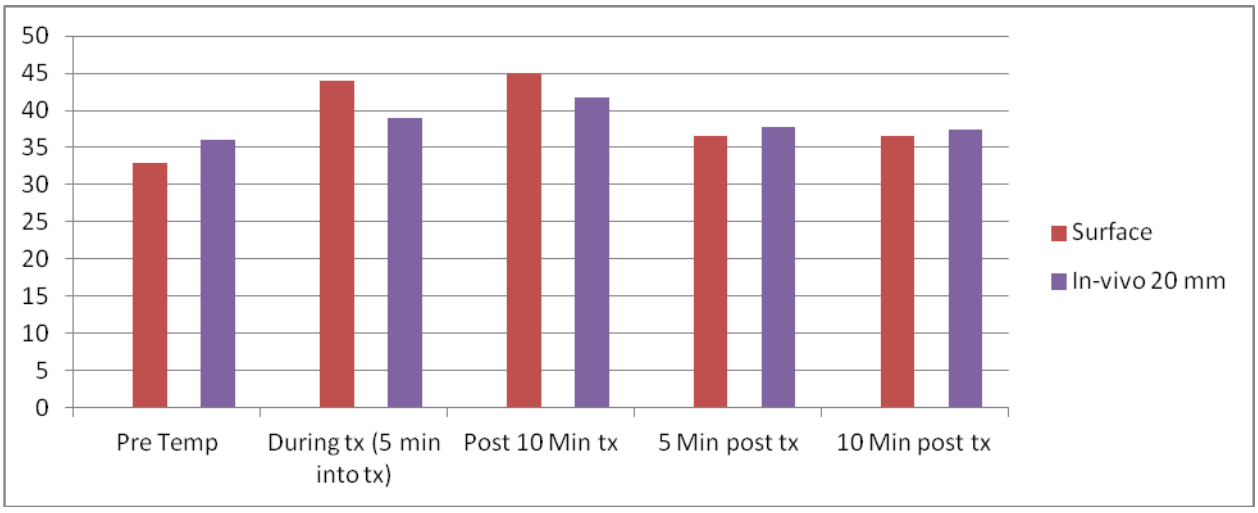

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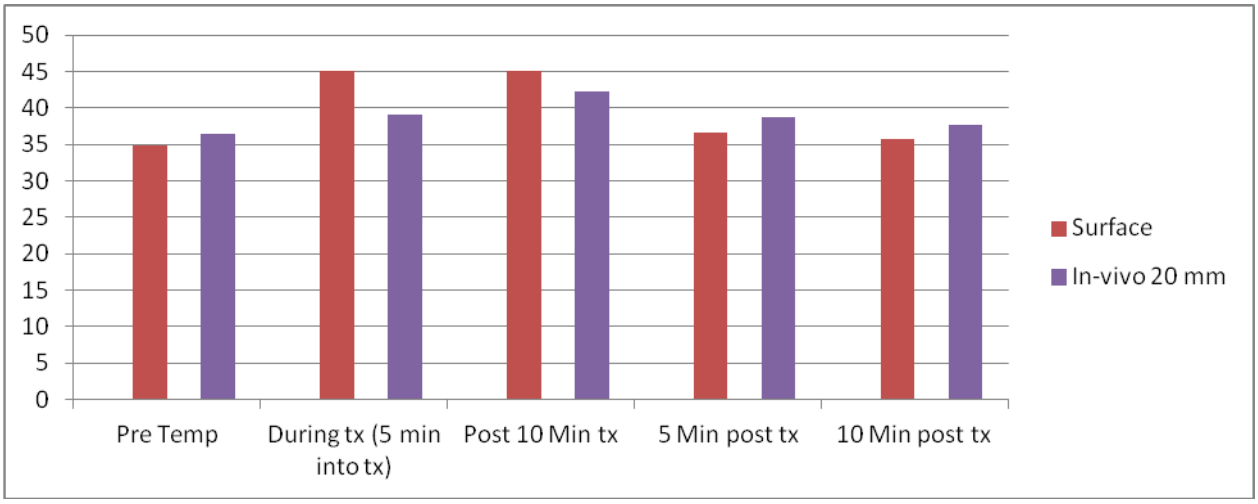

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1. Mulholland, Malcom, Chalfoun; Non-invasive Body Contouring with Radio Frequency, Ultrasound, Cryolypolysis and Low Level Laser Therapy. Clinics in Plastic Surgery 2011;July – Volume 38: Number 3.
2. Ajaka; Comparative study of the temperatures reached at the surface, 10mm and 20mm depths when performing the non invasive Venus Freeze® on the lower abdomen.