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Multisource, Phase-controlled Radiofrequency for Treatment of Skin Laxity: Correlation Between Clinical and In-vivo Confocal Microscopy Results and Real-Time Thermal Changes January 2011

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Abstract

Objective: The objective of this study was to analyze the correlation between degrees of clinical improvement and microscopic changes detected using confocal microscopy at the temperature gradients reached in patients treated for skin laxity with a phase-controlled, multisource radiofrequency system. **Design and setting:** Patients with skin laxity in the abdominal area were treated in six sessions with radiofrequency (the first 4 sessions were held at 2-week intervals and the 2 remaining sessions at 3-week intervals). Patients attended monitoring at 6, 9, and 12 months. **Participants:** 33 patients (all women). **Measurements:** The authors recorded the following: variations in weight, measurements of the contour of the treated area and control area, evaluation of clinical improvement by the clinician and by the patient, images taken using an infrared camera, temperature (before, immediately after, and 20 minutes after the procedure), and confocal microscopy images (before treatment and at 6, 9, and 12 months). The degree of clinical improvement was contrasted by two external observers (clinicians). The procedure was performed using a new phase-controlled, multipolar radiofrequency system. **Results:** The results reveal a greater degree of clinical improvement in patients with surface temperature increases greater than 11.5°C at the end of the procedure and remaining greater than 4.5°C 20 minutes later. These changes induced by radiofrequency were contrasted with the structural improvements observed at the dermal-epidermal junction using confocal microscopy. Changes are more intense and are statistically correlated with patients who show a greater degree of improvement and have higher temperature gradients at the end of the procedure and 20 minutes later. **Conclusion:** Monitoring and the use of parameters to evaluate end-point values in skin quality treatment by multisource, phased-controlled radiofrequency can help optimize aesthetic outcome. (*J Clin Aesthet Dermatol.* 2011;4(1):28–35.)

Skin laxity is an aesthetic problem that occurs between the ages of 35 and 40 years, although it generally starts to become visible from age 40 onward. Problems with skin laxity and quality also start to appear in younger people as a consequence of pregnancy or sudden weight loss. 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.[1,2] The demand for treatment of skin laxity is growing as the conventions of beauty become increasingly demanding. Laxity is a skin disorder that occurs with natural or accelerated aging and is structurally linked to diminished collagen production. The number and vitality of fibroblasts decrease, and both the dermis and the fibrous septa undergo partial loss of their natural ability to replace themselves. The morphological changes 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.[3] It occurs early on the inner arms and legs and on the abdominal area. Skin laxity is associated with lack of physical exercise, rigorous dieting, and other causes and it often appears in combination with cellulite. Cellulite is an inflammation of the subcutaneous adipose tissue and has several causes. It occurs mainly on the legs, buttocks, hips, breasts, arms, and neck.[4] Depending on the pathogenic mechanism, it is classed as dermopanniculosis deformans, adiposis edematosa, or gynoid lipodystrophy.[5–9] The fibrous structure of the interlobular septa that divide female subcutaneous cell tissue into compartments is arranged perpendicular to the skin surface. This structure enables fat lobules in each septum to move toward the skin surface, which is the only structure that contains them. Some authors consider that cellulite visible to the naked eye is caused by lengthening and weakening of connective tissue fibers accompanied by fat protrusion.[10–11]

Radiofrequency is useful in treating skin laxity. Heat-induced behavior of connective tissue and the degree of contraction achieved depend on factors such as the highest temperature reached (peak temperature), duration of exposure to radiofrequency, and the mechanical stress applied to tissue during the heating process. The thermal properties of tissue can also vary depending on skin quality, age, pH, electrolyte concentration, orientation and concentration of collagen fibers, and levels of tissue hydration. Treatment involves increasing tissue temperature to between 55°C and 62°C so that local vasodilatation is triggered and new collagen is formed.[12–16]

The authors have clinical experience with different radiofrequency systems (monopolar and bipolar), either alone or in combination with vacuum and infrared systems that have been analyzed in several published clinical trials.[15–19] Their results have varied, ranging from excellent on occasion to very poor or ineffective. In this study, the authors used a phase-controlled, multisource radio-frequency system (EndyMed PRO™, EndyMed Medical, Caesarea, Israel). This system allows the user to confine the emission of energy to a depth of up to 11mm and makes it possible to apply concentrated heat to the papillary dermis, reticular dermis, and fascia superficialis. The authors also searched for clinical references and performed a histological verification of the efficacy of the treatment in order

to improve the results. They analyzed subjective and objective levels of improvement and their relationship with temperature modifications as well as the histological changes observed with confocal laser scanning microscopy (CLSM).

This clinical study was carried out according to the ethical principles of the declaration of Helsinki and the guidelines for Good Clinical Practice. The authors had no affiliation with or financial involvement in any organization or entity with a direct financial interest in the subject matter or materials discussed in the manuscript.