

Histological and Ultrastructural Evaluation of the Effects of a Radiofrequency-Based Nonablative Dermal Remodeling Device

A Pilot Study

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Background Many light- and laser-based systems are used to reduce cutaneous wrinkles, and some have been shown to stimulate dermal collagen production. Using the ThermoCool TC radiofrequency device to treat bovine tendon and human abdominal skin, we documented the cutaneous effects of a radiofrequency-based system for nonablative treatment.

Observations Electron microscopy of bovine tendon treated at varied heat and cooling settings revealed collagen fibrils with increased diameter and loss of distinct borders as deep as 6 mm. Human skin treated at varied heat and cooling settings and examined by means of routine light microscopy demonstrated no significant changes in the epidermis or dermal ground substance immediately after treatment; there was scattered mild perivascular and periadnexal inflammation. Three and 8 weeks after treatment, no observable changes were noted. Ultrastructural analysis, however, disclosed isolated, scattered areas of collagen fibrils with increased diameter and loss of distinct borders. In addition, Northern blot analysis demonstrated an increase in collagen type I messenger RNA steady-state expression.

Conclusions Our findings suggest that collagen fibril contraction occurs immediately after treatment and gives rise to tissue contraction and thermally mediated wounding, which induces new collagen production.

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