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OPTIMAL PARAMETERS FOR FRACTIONAL REJUVENATION: THEORY AND EXPERIMENT

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Background and Objectives: Fractional approach to skin rejuvenation has been recently suggested to increase the treatment safety and accelerate recovery while maintaining efficacy comparable to traditional ablative procedures. The objectives of this study are two-fold: First, we quantitatively compared the two approaches with respect to safety. Second, we have investigated effects of varying treatment parameters on the outcome of the fractional resurfacing procedure and formulated optimal sets of parameters.

Study Design/Materials and Methods: A periodic lattice of optical and thermal islands in skin were simulated with proprietary advanced optical-thermal modeling software and evaluated *in vitro* with histological sectioning of Yucatan black pig skin. The skin samples were treated with a 1540 nm Er:glass laser (Lux1540fractional prototype, Palomar Medical Technologies, Inc) and evaluated for damage with LDH and H&E staining techniques.

Results: The safety margin (i.e., ratio of maximally safe to minimally effective energy) is increased from 130–140% for the full-skin therapy to about 300% for the fractional therapy with small fill factor (treatment area to total skin area). The fill factor has to be carefully controlled to provide a reasonable compromise between efficacy and safety.

Conclusions: The fractional approach may provide effective yet safer skin rejuvenation under the proper choice of treatment parameters. It is crucial for the treatment safety that the islands are distributed regularly (periodically).