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Research Article

Clinical trial of a novel non-thermal LED array for reversal of photoaging: Clinical, histologic, and surface profilometric results^{†‡}

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[†]This data was presented in abstract form at annual meetings of ASLMS in 2002, 2003, and 2004.

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KEYWORDS

light emitting diodes • photorejuvenation • light therapy • laser • skin rejuvenation • pigmentation

ABSTRACT

Background and Objectives

Photomodulation has been described as a process which modifies cell activity using light sources without thermal effect. The objective of this study was to investigate the use of a non-thermal low dose light emitting diode (LED) array for improving the appearance of photoaged subjects.

Study Design/Materials and Methods

This prospective study investigated a random cohort of patients (N = 90) with a wide range of photoaged skin treated by LED photomodulation® using a full panel 590 nm non-thermal full face LED array delivering 0.1 J/cm² with a specific sequence of pulsing. Subjects were evaluated at 4, 8, 12, 18 weeks and 6 and 12 months after a series of 8 treatments delivered over 4 weeks. Data collected included stereotactic digital imaging, computerized optical digital profilometry, and peri-ocular biopsy histologic evaluations for standard stains and well as collagen synthetic and degradative pathway immunofluorescent staining.

Results

Digital imaging data showed a reduction of signs of photoaging in 90% of subjects with smoother texture, reduction of peri-orbital rhytids, and reduction of erythema and pigmentation. Optical profilometry showed a 10% improvement by surface topographical measurements. Histologic data showed markedly increased collagen in the papillary dermis of 100% of post-treatment specimens (N = 10). Staining with anti-collagen I antibodies demonstrated a 28% (range: 10%-70%) average increase in density while staining with anti-matrixmetalloproteinase (MMP)-1 showed an average reduction of 4% (range: 2%-40%). No side effects or pain were noted.

Conclusions

Photomodulation to reverse photoaging is possible with a specific array of LEDs with a specific fluence using a precise pulsing or “code” sequence. Skin textural improvement by digital imaging and surface profilometry is accompanied by increased collagen I deposition with reduced MMP-1 (collagenase) activity in the papillary dermis. This technique is a safe and effective non-painful non-ablative modality for improvement of photoaging. © 2005 Wiley-Liss, Inc.