

PREDOMINANTLY NON-THERMAL FACIAL SKIN PHOTO-REJUVENATION USING A SEQUENTIALLY COMBINED NEAR INFRA-RED 840NM-880NM LED FACIAL MASK

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Background

Facial skin shows clinical signs of aging earlier and more evidently than other anatomical body areas leading to the clinical perception of premature aging (chrono+photo-aging). Many rejuvenating procedures have been proposed to slow down or partially reverse aging processes. Less aggressive methods are preferred by the majority of patients. Predominantly non-thermal IR-A LED photo-biomodulation has proven effective in triggering intra-cellular photo-biochemical reactions leading to new collagen synthesis and reduction of MMP-1. The objective of this study is to assess the effectiveness, safety, and tolerability of a novel, sequentially combined continuous (CW) 835±5nm and pulsed emission (PW) 875±5nm LED array, evenly distributed on the internal surface of an anatomically designed polystyrene facial mask in the treatment of facial premature aging.

Study

Ten Fitzpatrick type 2-3 patients (age 55-77 mean 47) affected by premature aging were recruited. Each subject received a series of eight combined 840(CW) and 880(PW) treatments using a EPI-C Plus system (Espansione Marketing, Fano-Bologna, Italy). Treatment sessions lasted 15 minutes, delivered a total fluence of 66J/cm², and were performed twice a week. Elastometry, skin colorimetry, and standardized computerized complexion analysis were performed to objectively assess clinical improvements. Measurements were taken immediately before treatment, 15 days after completing the full series of treatments, and 30 days thereafter. Standardized digital photographs were taken immediately pre- and 45 days post-treatment to be assessed by two independent observers. Subjective assessment regarding treatment outcome and willingness to repeat the procedure was also obtained.

Results

All subjects completed the study. Based on computerized feature complexion analysis and digital elastometry, skin texture, wrinkle count, and skin elasticity showed significant improvement 15 days (-8.96% texture; -23.23% wrinkles; +20.59% elasticity) and 45 days (-6.93% texture; -16.80% wrinkles; +10.99% elasticity) after 8 LED facial treatments. Surface skin erythema showed a progressive, moderate increase with time: +0.97% and +4.81%, after the same intervals of time, confirming a positive vaso-active tissue response, possibly associated with intercellular matrix remodelling. Minimal surface micro-dyspigmentation was detected by computerized digital skin complexion analysis 15 days (+0.69%) and 45 days (+11.96%) after the end of 8 LED treatment sessions. These alterations were not visibly perceptible neither by study subjects nor by conventional clinical evaluation. Skin texture and wrinkles were considered improved by the majority of subjects 15 days (100% and 90% respectively) and 45 days (100% and 90%) after the end of LED treatments. Skin tone was considered also improved (50% of subjects rated treatment extremely effective, 40% very effective, and 10% moderately effective) 15 days after LED treatments. 100% of subjects considered their skin tone improved 45 days after their last LED treatment. Moderate burning and warmth sensation were reported by 70% of subjects during, and immediately after LED exposures, confirming the presence of a

moderate photo-thermal component associated with IR-A LED photo-biomodulation. Identification of pre-treatment digital images of treated subjects by two independent, blind dermatologists showed 90% concordance.

Conclusion

A series of combined, sequential CW 840nm and PW 880nm narrowband LED irradiations, delivered through an innovative anatomically designed facial mask, has proven effective in temporarily improving premature aging-related structural and functional skin alterations. Treatment sessions were well-tolerated. Minimal side effects, like moderate intra-treatment and immediately post-treatment burning warmth were reported. This particular repetitive predominantly non-thermal tissue bio-stimulation could be proposed as a useful strategy to prolong "healthy aging" either alone or in combination with other invasive or non-invasive procedures