

Regulation of skin collagen metabolism in vitro using a pulsed 660 nm LED light source: clinical correlation with a single-blinded study.

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Abstract

It has been reported that skin aging is associated with a downregulation in collagen synthesis and an elevation in matrix metalloproteinase (MMP) expression. This study investigated the potential of light-emitting diode (LED) treatments with a 660 nm sequentially pulsed illumination formula in the photobiomodulation of these molecules. Histological and biochemical changes were first evaluated in a tissue-engineered Human Reconstructed Skin (HRS) model after 11 sham or LED light treatments. LED effects were then assessed in aged/photoaged individuals in a split-face single-blinded study. Results yielded a mean percent difference between LED-treated and non-LED-treated HRS of 31% in levels of type-1 procollagen and of -18% in MMP-1. No histological changes were observed. Furthermore, profilometry quantification revealed that more than 90% of individuals showed a reduction in rhytid depth and surface roughness, and, via a blinded clinical assessment, that 87% experienced a reduction in the Fitzpatrick wrinkling severity score after 12 LED treatments. No adverse events or downtime were reported. Our study showed that LED therapy reversed collagen downregulation and MMP-1 upregulation. This could explain the improvements in skin appearance observed in LED-treated individuals. These findings suggest that LED at 660 nm is a safe and effective collagen-enhancement strategy.

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