Fluorescent light energy: the future for treating inflammatory skin conditions?

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Background We have previously reported clinical efficacy with a novel form of photobiomodulation – a biophotonic platform inducing fluorescent light energy (FLE) in both disease-affected and healthy skin, however the cellular mechanisms are largely unknown. Objective The aim of this study was to investigate the cellular mechanism of action of FLE on key skin and immune cells, which may underlie our clinical efficacy observed. Methods We examined the effect of FLE on the clinical presentation of inflammation in a representative acne vulgaris patient. The effect of FLE and a FLE-mimicking control lamp on collagen production from primary human dermal fibroblast (HDF) cells was assessed in the presence and absence of the pro-inflammatory cytokine, interferon gamma (IFN-γ). Cytokine production was assessed from HDF and human epidermal keratinocytes (HEK) exposed to M1 macrophage-conditioned media following illumination with either a blue LED or FLE. Finally, the effect of FLE on angiogenesis was assessed in human aortic endothelial (HAE) cells. Results FLE reduced inflammatory lesions and associated redness in the representative acne patient. Once the inflammation was resolved, there was a visible overall enhancement of the skin’s texture. FLE enhanced collagen production from non-stressed HDF cells, decreased the inflammatory profile of HDF and HEK cells and enhanced angiogenesis in HAE cells. Conclusion FLE is a unique platform serving both aesthetic and therapeutic purposes by enhancing collagen production, modulating cutaneous inflammation and encouraging angiogenesis. Whilst further research is required, our findings have important implications for approaches to treating inflammatory skin conditions and achieving better aesthetic outcomes.

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