

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

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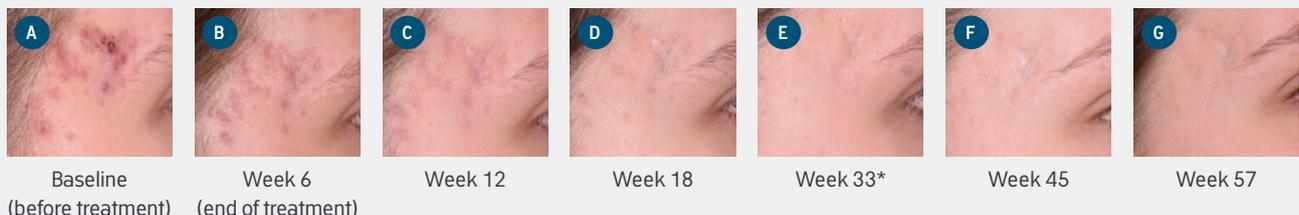
## OBJECTIVE

The clinical efficacy of fluorescent light energy (FLE) has previously been reported in both disease-affected and healthy skin. This paper's main objective was to investigate the cellular mechanism of action of fluorescent light energy (FLE) on skin cells.

## RESULTS

Different studies were performed to see the effect of FLE related to inflammatory skin conditions:

- Effect on the inflammation in a representative acne vulgaris patient:
  - Reduction of inflammatory lesions and associated redness. Once inflammation was resolved, there was a visible overall enhancement of the skin's texture and visibly faded acne scarring (**Fig.1**).



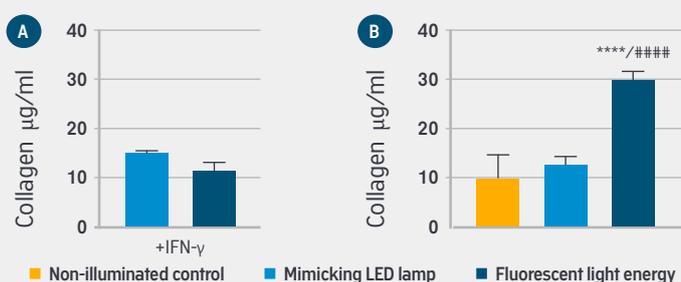
**Fig.1. A.** Woman with severe acne and inflammatory lesions on the temple. **B.** Marked reduction in redness following 6 weeks of treatment. **D.** Redness and inflammation were resolved at week 18. **E-G.** As the inflammatory area was settling over time (week 12 onwards), there was a concurrent improvement of scar appearance

- Effect of FLE compared to continuous LED light on collagen production from primary human dermal fibroblast (HDF) in both, presence and absence of the pro-inflammatory cytokine interferon gamma (IFN- $\gamma$ ), which simulates stressed HDF cells.

To test this, three sets of cells were prepared and exposed to: **1)** Non-illuminated control; **2)** Mimicking lamp and **3)** Exposed to FLE.

The mimicking lamp had an identical spectral output to Kleresca<sup>®</sup>, but was generated by continuous LED light instead of excited chromophore emissions combined with blue LED light, i.e. no fluorescence created.

- Collagen production in fibroblasts treated with FLE was significantly increased compared to non-illuminated control cells and cells treated with the mimicking lamp (**Fig. 2**)
- FLE enhanced the collagen production from non-stressed HDF cells (absence of IFN- $\gamma$ ), explaining why we do not see collagen production in stressed and inflamed skin



**Fig.2. A.** Cells pretreated with IFN- $\gamma$ , simulating stressed skin and inflammatory conditions, did not increase collagen production.

**B.** For non-stressed HDF cells collagen, production was significantly increased for FLE compared to non-illuminated control cells and those treated with the mimicking lamp.

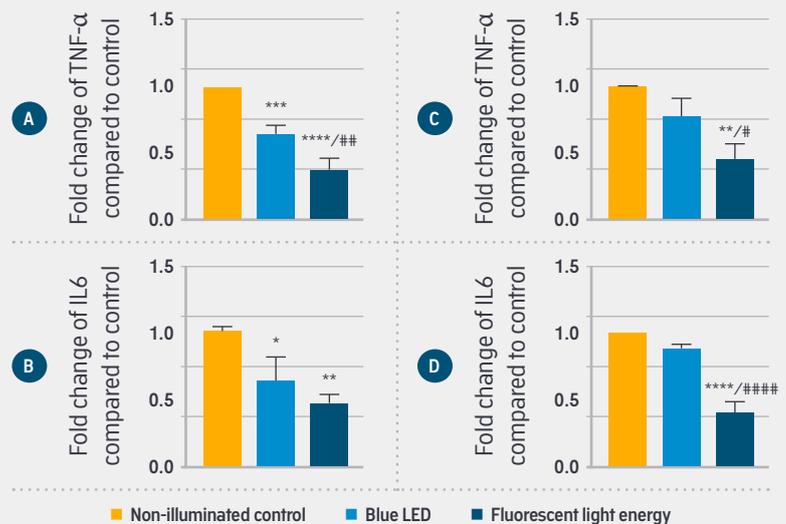
- Effect on cytokine production from HDF and human epidermal keratinocytes (HEK) after illumination with either blue LED or FLE.
  - » Higher decrease in the inflammatory profile of HDF and HEK cells using FLE compared to blue LED light (**Fig. 3**)
  - » HEK only responded to treatment with FLE

**Fig. 3. A.** FLE significantly reduced TNF- $\alpha$  release from HDF cells compared to blue LED light

**B.** IL-6 release was significantly reduced from HDF cells following both blue LED light treatment and FLE treatment compared to non-illuminated control cells

**C.** TNF- $\alpha$  release from HEK cells was not affected by blue LED, however FLE-treatment decreased its production.

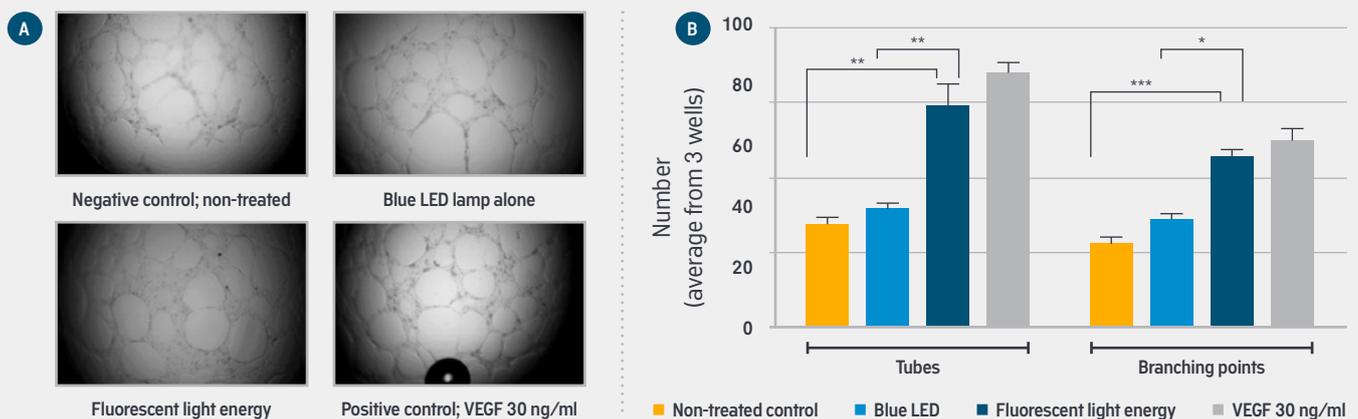
**D.** IL-6 release from HEK cells was not affected by blue LED but was significantly decreased with FLE-treatment.



- Effect on angiogenesis in human aortic endothelial (HAE) cells compared to blue LED.

In order to check this, cells were divided in four groups and treated differently: **1)** Negative control, non-treated; **2)** Blue LED lamp; **3)** FLE and **4)** Positive control with growth factor (VEGF, Vascular endothelial growth factor).

- » Enhanced angiogenesis in HAE compared to blue LED. (**Fig.4**)



**Fig. 4 A and B.** Treatment with FLE significantly increased both branching and tube formation compared to either non-illuminated control cells or blue LED alone.

## CONCLUSIONS

- FLE has the capacity to enhance fibroblastic collagen production, attenuate the inflammatory signature of a variety of cutaneous cells and enhance angiogenesis
- FLE serves both aesthetic and therapeutic purposes by contributing to normalize and de-stress the skin
- FLE was superior to an equivalent continuous conventional LED light
- FLE has shown good results for the treatment of inflammatory skin conditions and achieves better aesthetic outcomes

For more information, visit the original [publication](#).