

FLUORESCENT LIGHT ENERGY (FLE) ACTS ON MITOCHONDRIAL PHYSIOLOGY IMPROVING WOUND HEALING

FERRONI *ET AL.*, 2020

INTRODUCTION

This work aims to investigate the effect of Fluorescent Light Energy (FLE) on mitochondrial homeostasis in an *in vitro* model of inflammation.

Confocal microscopy and gene expression profiling were performed on cultures of inflamed HDFs treated with direct light from a multi-LED lamp and FLE from 2 systems with photoconverter (FLE-gel and FLE-matrix).

RESULTS AND DISCUSSION

- To generate FLE, specialized chromophores (light-absorbing molecules) translate light energy into a low-energy emission of fluorescence through a mechanism known as stokes shift.
- Assessment using confocal microscopy revealed the mitochondrial networks restored in 24-h after treatment with FLE.
- A greater recovery is visible in FLE-treated (yellow and orange lines) for Light-treated cells (blue lines) at 30-min post-treatment compared to the healthy condition (green lines) and the inflamed status (red lines) (**Fig. 1**).

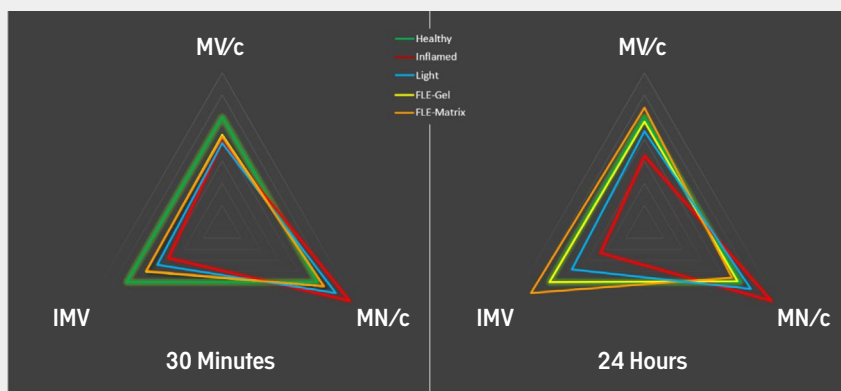


Fig. 1. Mitochondrial network radial graphs. MV/c = Mitochondria Volume per cell; MN/c = Mitochondria Number per cell; IMV = Individual Mitochondrion Volume.

- The gene expression analysis showed that FLE upregulated UCP1 and CPT1B genes, which encode proteins that favor ATP production through oxidative phosphorylation and lipid oxidation.
- Treatment with FLE upregulated SLC25A31 gene, linked to cytosolic adenosine diphosphate (ADP) balance.
- UCP genes facilitate the transfer of anions and protons across the mitochondrial membrane, which leads to a decrease in reactive oxygen species (ROS) production.
- FLE low-energy photons absorbed by cytochrome c oxidase (CCO) might restore the mitochondrial network due to an increased ATP production.
- The return of mitochondrial homeostasis by FLE could be a key mechanism supporting accelerated healing and tissue regeneration in wounds and skin pathologies.

CONCLUSIONS

FLE-treated HDFs demonstrate both a quicker and significant recovery. These observations, with the capacity to stimulate CCO, show the beneficial effect of FLE on mitochondrial homeostasis and consecutively in the treatment of inflamed wounds.

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