Photobiomodulation of blue LED light in cell metabolism, proliferation and ionic membrane currents in human cultured keloid fibroblasts

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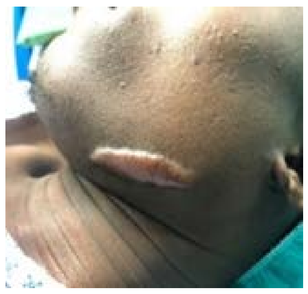
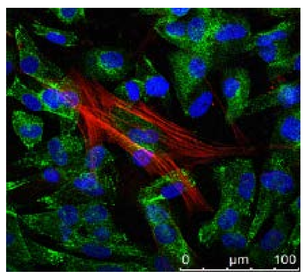
Purpose

To study the effects of blue LED light in keloid tissues, in view of a possible application to prevent the keloid occurrence

Methods

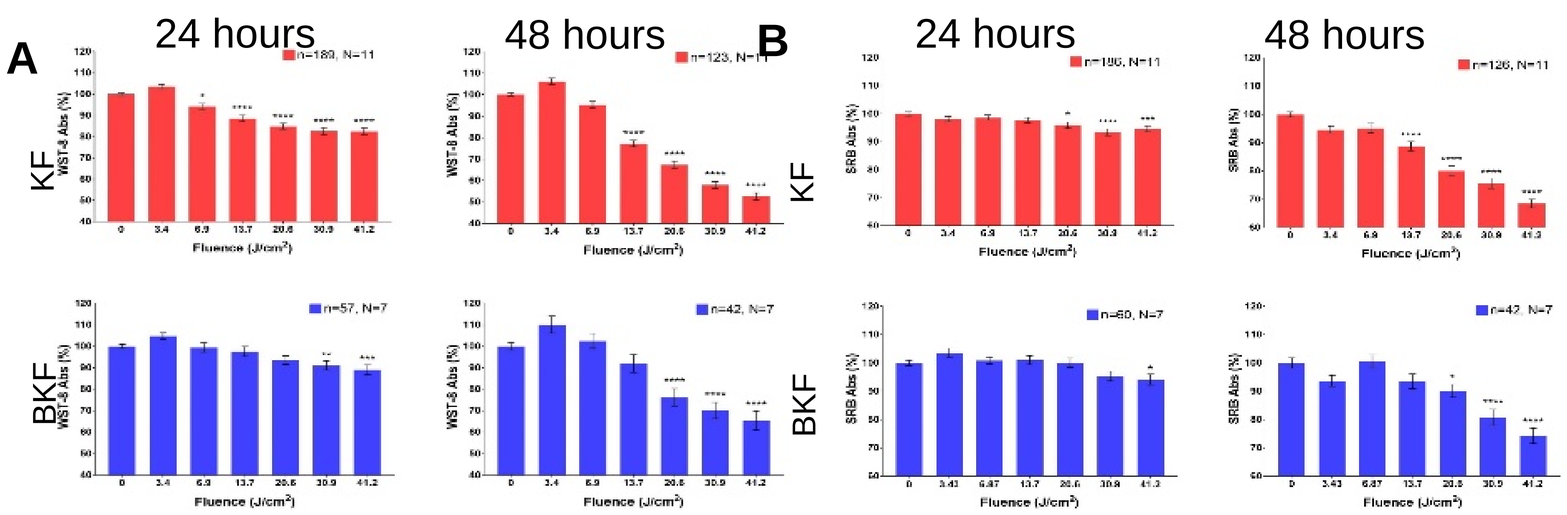




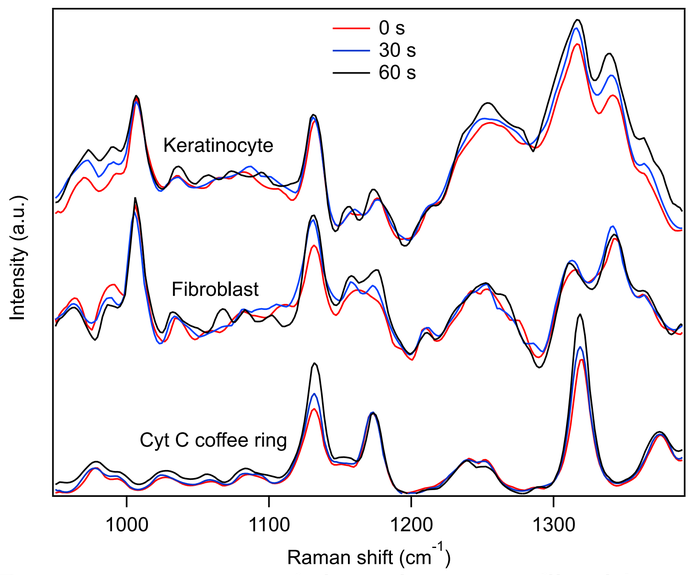
The blue (420 nm) LED light device: flexible polymeric fiber- 1.2 m in length. Power density: 1.2 W/cm^2.

Primary cultures of keloid fibroblasts were isolated from 12 patients while boundary keloid fibroblasts from 9 patients. The cultures were characterized by confocal microscopy (cell nuclei: blue, alpha-SMA: red, type I collagen: green)

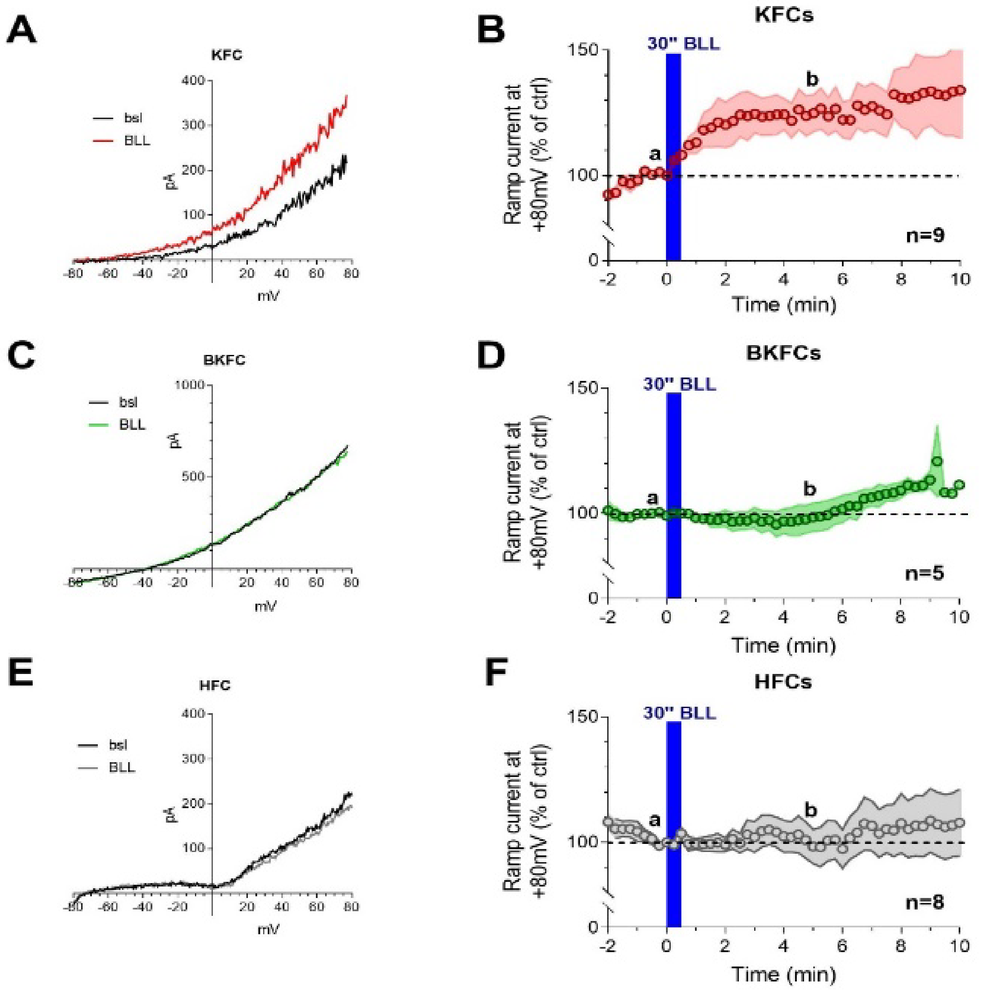
Results



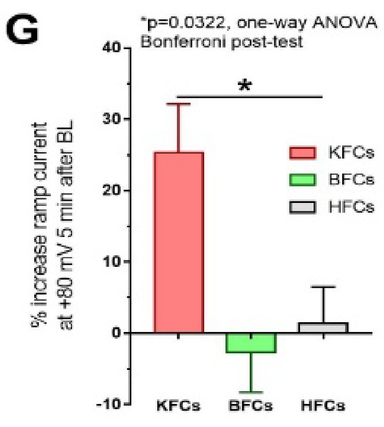
Cell metabolism was analysed with WST-8 (**A**); **cell proliferation** with SRB (**B**) assays. Measure is repeated in triplicate @ 24 hours, in duplicate @ 48 hours after treatment (3.4-41.2 J/cm^2). Significant values: *$p \leq 0.05$; ***$p \leq 0.001$; ****$p \leq 0.0001$ *vs* control, one-way ANOVA followed by Dunnett's multiple comparison test.



Raman spectra of keratinocyte, fibroblast and free Cyt C. Not irradiated samples: red; 20.6 J/cm^2 treated samples: blue; 41.2 J/cm^2 treated sample: black.



Outward potassium currents A: Original whole-cell patch-clamp current traces evoked by a voltage ramp protocol (from -80 to +80 mV, 800 ms) in a typical keloid fibroblast cell (KFC) before (baseline: bsl) or after the application of 21.6 J/cm^2 blue light (BLL, 5 min); in a boundary fibroblast (BKFC) (**C**); in a typical healthy fibroblast (HFC) (**D**). **B**: Time course of ramp-evoked currents at +80 mV in KFCs cells before, during and after irradiation, (mean±SEM, n=9); in BKFCs (mean±SEM, n=5= (**D**); in HFCs (mean±SEM, n=8). **G**: Column bars represent the percentage increase in ramp-evoked outward potassium currents in different experimental groups. #$p < 0.05$ vs KF, one-way ANOVA, Bonferroni post-test.



Conclusions: Current data demonstrate that the blue LED light, emitted at 420nm, decreases both cell metabolism and proliferation without affecting cell viability, in cultured human keloid fibroblast. Furthermore, in the same cells the blue led light increases outward potassium currents and induces a modification in Cytochrome C oxidation state.

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References:

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