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The effect of photobiomodulation at 660 nm on the differentiation of diabetic wounded WS1 human fibroblasts into myofibroblasts

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Diabetes is associated with complicated wound healing and rapid wound progression which may be due to cells that fail to proliferate and differentiate, thus leading to ulcers and limb amputations. The administration of photobiomodulation (PBM) has been associated with increased cellular proliferation, a decrease in wound repair duration and an increase in wound flexibility. Most studies performed on PBM and myofibroblasts dwell mostly on fibrosis, and a minority of studies have investigated fibroblast differentiation for use in diabetic wound healing. This study aimed to determine the effect of PBM at 660nm with 5 J/cm2 on the differentiation of diabetic wounded human fibroblasts at different time points. This was achieved by measuring the expression of the fibroblast surface marker Thy-1 (CD90) by flow cytometry, proto-myofibroblast marker EDA fibronectin (EDA-FN) by ELISA, and the myofibroblast marker alpha smooth muscle actin (α-SMA) by flow cytometry. The measurement of the cellular markers was done at 24, 48 and 72 h. Post-PBM, there was a significant decrease in Thy-1 at 48 and 72 h, an increase in EDA-FN at 48 h, and an increase in α-SMA at 48 and 72 h. PBM at 660 nm with 5 J/cm2 stimulates cellular differentiation of diabetic wounded fibroblast cells into myofibroblasts, which contributes to the increased rate of wound healing observed in PBM.

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