PHOTOBIOMODULATION

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EFFECTS OF LASER PULSING ON CELL VIABILITY

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Background: Continuous wave photobiomodulation (cwPBM) has been shown to induce cell proliferation in many different cell lines both *in vitro* and *in vivo*. While pulsed wave photobiomodulation (pwPBM) has shown similar effects, the parameters for pwPBM are not as well characterized as cwPBM. Laser treatment can be manipulated by changing a variety of pulsing parameters including pulse interval, pulse duration, pulse train interval, and pulse train duration in addition to total irradiance and time providing more treatment variables than cwPBM. These parameters could facilitate better optimization of PBM for therapeutic benefit.
Study: This study investigates how various pulsing parameters affect cell viability and proliferation of oral keratinocyte and fibroblast cell lines. Cells were irradiated with an 810 nm diode using different pulsing parameters and following incubation for 24 hours, proliferation was quantified using an Alamar Blue assay and compared to untreated controls.
Results: We noted that keratinocytes were more responsive to the effects of the laser than fibroblasts, resulting in a discrete set of optimal pulsing parameters for each cell type. Pulsing allows significant control on therapeutic dosing as it allows the ability to distinct eliminate thermal damage while facilitating increased dosing. Keratinocytes were observed to respond differently to changes in pulse intervals, pulse durations and total irradiance than fibroblasts. We further characterized that the cell type responses were due to variations in their inherent redox potentials.
Conclusion: This study demonstrates the effects of laser pulsing on distinct cell types and suggests that optimization of laser treatments based on target cell types could improve clinical efficacy and therapeutic benefit for photobiomodulation.