

Photobiomodulation Therapy Promotes Expansion of Epithelial Colony Forming Units

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Abstract

Objective: This preliminary study examines the effects of low-dose light therapy, also called Photobiomodulation (PBM) therapy, on epithelial colony forming units (eCFUs) in epithelial cells from skin and mucosa to assess their potential to contribute to tissue regeneration. Also, preliminary comparison of basic PBM parameters such as wavelengths, light sources, and dose were evaluated in promoting eCFUs.

Background Data: Regenerative medicine is at the brink of exploiting the tremendous potential offered by advances in stem cell biology. The two distinct aspects for utilization of stem cells, either resident (endogenous) or transplanted (exogenous), rely on cells amenable to expansion and being directed toward mature, functional tissues. Despite major progress in fundamental understanding of stem cell pluripotency, there remain fundamental challenges in applying these insights into clinical practice.

Methods: PBM treatments with various devices, wavelengths, and doses were used on two epithelial cell lines and colony forming assays were performed.

Results: This study noted a dose-dependent effect of 810 nm laser on increasing eCFUs, either in terms of size or numbers. Comparisons of different wavelengths and light sources noted better efficacy of collimated and coherent lasers compared to LEDs and broad-band light.

Conclusions: PBM therapy promotes expansion of eCFUs that represent progenitors and stem cell populations capable of contributing to tissue repair and regeneration. Further exploration of the precise mechanisms would allow optimization of PBM clinical protocols to harness the regenerative potential of stem cells for wound healing and other clinical regenerative applications.