

Photobiomodulation of Dental Derived Mesenchymal Stem Cells: A Systematic Review

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Abstract

Objective: This study aimed to conduct a systematic review of the literature published from 2000 to August 2015, to investigate the effect of photobiomodulation (PBM) therapy on dentoalveolar-derived mesenchymal stem cells (ddMSCs), assessing whether a clear conclusion can be reached from the data presented. **Background data:** Systematic reviews provide the best evidence on the effectiveness of a procedure and permit investigation of factors that may influence the performance of a method. To the best of our knowledge, no previous systematic review has evaluated the effects of PBM only on ddMSCs. **Methods:** The search was conducted in PubMed /MEDLINE[®], Scopus and Web of Science databases, and reported according to the Preferred Reporting Items for Systematic Reviews and Metaanalyses (PRISMA Statement). Original research articles investigating the effects of PBM therapy on ddMSCs, published from 2000 to August 2015, were retrieved and used for this review according to the following eligibility criteria: evaluating PBM therapy, assessing stem cells of dentoalveolar origin, published in English, dealing with cells characterized as stem cells, and using light that did not need external chromophores. **Results:** From the initial 3467 potentially relevant articles identified, 6 were excluded because they were duplicates, and 3453 were considered ineligible based on the inclusion criteria. Therefore, eight articles remained, and these were fully analyzed in order to closely check exclusion criteria items. Only one of them was excluded because the cultured cells studied were not characterized as stem cells. Finally, seven articles served as the basis for this systematic review. **Conclusions:** PBM therapy has no deleterious effects on ddMSCs. Although no other clear conclusion was obtained because of the scarce number of publications, the results of these studies are pointing to an important tendency of PBM therapy to improve ddMSCs' viability and proliferation.

Keywords: dental pulp, low level laser, low power laser, photobiomodulation, phototherapy, stem cell

Introduction

PHOTOBIMODULATION (PBM) THERAPY is based on the exposure of biological tissues to low-level laser light or light-emitting diodes (LEDs), leading to modulation of cellular functions. The mechanistic basis of this therapy is being disclosed, showing that it can elicit both stimulatory and inhibitory responses, depending upon the light parameters used.¹ Mostly, PBM is employed as adjunctive therapy in

several clinical situations in which, if applied with the correct parameters and indications, it has been shown to improve the clinical outcomes.

Knowledge of the mechanisms underlying the clinical effects of PBM therapy has been mainly obtained from *in vitro* studies, most of them using cells in culture.^{2,3} In fact, there is substantive information in the literature on the effects of PBM therapy at the cellular level. It has been reported to have effects on several cellular functions, such

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