



Effect of Photobiomodulation Therapy on the Increase of Viability and Proliferation of Human Mesenchymal Stem Cells.

Pasternak-Mnich K¹, Ziemba B², Szwed A³, Kopacz K⁴, Synder M⁵, Bryszewska M³, Kujawa J¹.

Author information

Abstract

BACKGROUND AND OBJECTIVES: We have investigated how low intensity laser irradiation emitted by a multiwave-locked system (MLS M1) affects the viability and proliferation of human bone marrow mesenchymal stem cells (MSCs) depending on the parameters of the irradiation.

STUDY DESIGN/MATERIALS AND METHODS: Cells isolated surgically from the femoral bone during surgery were identified by flow cytometry and cell differentiation assays. For irradiation, two wavelengths (808 and 905 nm) with the following parameters were used: power density 195, 230, and 318 mW/cm², doses of energy 3, 10, and 20 J (energy density 0.93-6.27 J/cm²), and in continuous (CW) or pulsed emission (PE) (frequencies 1,000 and 2,000 Hz).

RESULTS: There were statistically significant increases of cell viability and proliferation after irradiation at 3 J (CW; 1,000 Hz), 10 J (1,000 Hz), and 20 J (2,000 Hz).

CONCLUSIONS: Irradiation with the MLS M1 system can be used in vitro to modulate MSCs in preparation for therapeutic applications. This will assist in designing further studies to optimize the radiation parameters and elucidate the molecular mechanisms of action of the radiation. *Lasers Surg. Med.* © 2019 Wiley Periodicals, Inc.

© 2019 Wiley Periodicals, Inc.

KEYWORDS: MLS M1 system; differentiation; mesenchymal stem cells; photobiomodulation therapy (PBMT); proliferation; viability

PMID: 31165521 DOI: [10.1002/lsm.23107](https://doi.org/10.1002/lsm.23107)

Grant support

LinkOut - more resources