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PROGRAM AND ABSTRACT BOOK

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Ilustração da Capa: Alexandre Takashi

SP-10.04 - Low power light triggers opposite effects on stem cells: influence of the wavelength and culture conditions

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Photobiomodulation (PBM) has been gaining importance in a wide range of medical fields in the past few years, particularly in stem cell-based regenerative medicine. Improving in vitro cell proliferation, differentiation and viability are ways where PBM could play a pivotal role optimizing biotechnological and bioengineering applications. Here we investigated whether different wavelengths (blue, green and red) would promote distinct outcomes in human adipose-derived stem cells (hADSCs) cultured in regular and supplemented media for tenocyte differentiation. MATERIALS AND METHODS. Freshly isolated hADSCs were cultured in a specific stem cell medium (MSCGM, Lonza), DMEM or a tenogenic medium (TEN-M: DMEM supplemented with growth factors and ascorbic acid). Cells were irradiated every 48 h (23.28 mW/cm ^{2}, 17 min 10 s delivering 24 J/cm ^{2} per session) using a LED irradiator (LEDbox, BioLambda). MTT and crystal violet assays were used to evaluate cell metabolic activity and proliferation. Red wavelength (660 nm) significantly increased metabolic activity after five irradiations, but only for cells cultured in TEN-M. Oppositely, blue (450 nm) and green (520 nm) light decreased both cell proliferation and metabolic rate, with more pronounced effects for blue light in TEN-M. Considering these findings, we examined whether irradiating only the media would generate toxic compounds that could impair cell viability. We therefore assessed reactive oxygen species (ROS) production by p-nitrosodimethylaniline/histidine assay while irradiating the three different media under the same conditions as mentioned above. Immediately after blue and green light exposure, an increment in ROS production was observed for DMEM and TEN-M, that continuously increased until reaching between 4.5 and 7.1 μM one-hour after irradiation – with higher values for TEN-M exposed to blue light. Since no significant ROS formation was observed following red light exposure, we concluded that medium composition was responsible for the different effects on metabolic activity and proliferation observed after irradiation with different wavelengths.

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