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A comparative study of the effects of different low-level lasers on the proliferation, viability, and migration of human melanocytes in vitro

(Article)

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Abstract

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The aim of this study was to investigate the effects of different low-level laser therapies (LLLTs) of various wavelengths and energies on normal cultured human melanocytes. Various studies have shown the effects of LLLs on various types of cultured cells. Presently, little is known about the biological effects of LLLTs on melanocytes. Melanocytes were exposed to LLLT at 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, or 5.0 J/cm^2 using a blue (457 nm), red (635 nm), or ultraviolet (UV) (355 nm) laser. Melanocyte viability, proliferation, and migration were monitored at 72 h after irradiation. The blue ($P < 0.001$) and red ($P < 0.001$ and $P < 0.01$) lasers significantly enhanced viability at 0.5 to 2.0 J/cm^2, whereas the UV laser ($P < 0.001$) could significantly enhance viability only at 0.5 and 1.0 J/cm^2 compared with controls. The blue and red lasers also significantly enhanced the proliferation of the melanocytes at 0.5 to 2.0 J/cm^2 ($P < 0.001$), and the UV laser significantly enhanced proliferation at 0.5 to 1.5 J/cm^2 ($P < 0.001$ and $P < 0.01$) compared with controls. The blue laser significantly enhanced melanocyte migration at 0.5 to 4.0 J/cm^2 ($P < 0.001$ to $P < 0.05$), but the red ($P < 0.001$ and $P < 0.01$) and UV ($P < 0.001$ to $P < 0.05$) lasers could significantly enhance such migration at 0.5 to 1.0 J/cm^2 and 0.5 to 2.0 J/cm^2, respectively, compared with controls. LLLT at low energy densities is able to significantly increase melanocyte viability, proliferation, and migration in vitro, and at higher energy densities, it gives non-stimulatory results. Additionally, the blue laser was the best among the three lasers. These findings might have potential application in vitiligo treatment in future. © 2015, Springer-Verlag London.

SciVal Topic Prominence

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Cell culture | Low-level laser therapy | Melanocytes | Proliferation | Regenerative medicine | Tissue engineering | Viability

Indexed keywords

EMTREE medical terms: Article | biological activity | cell migration | cell proliferation | cell viability | comparative study | controlled study | density | energy | human | human cell | in vitro study | low level laser therapy | melanocyte | priority journal | ultraviolet irradiation | cell culture | cell motion | cell proliferation | cell survival | diode laser | melanocyte | physiology | radiation response | regenerative medicine | vitiligo

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