Effects on Stored Blood

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Low-Level Laser Therapy at Different Energy Densities (0.1-2.0 J/cm(2)) and Its Effects on the Capacity of Human Long-Term Cryopreserved Peripheral Blood Progenitor Cells for the Growth of Colony-Forming Units.

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Objective: The aim of this research was to investigate the effects of low-level laser therapy (LLLT) at different energy densities (0.1-2.0 J/cm(2)) on the capacity of long-term cryopreserved peripheral blood progenitor cell (PBPC) for growth of colony-forming units (CFU) in vitro. Background Data: There are no data concerning the effects of LLLT on human cryopreserved PBPC. Methods: Cryopreserved PBPC samples were thawed after 3 years in order to demonstrate the positive effect of LLLT and after 5 years in order to confirm the LLLT's proliferative effect. Cultures were plated in quadruplicate 35-mm-diameter Petri dishes in methylcellulose medium (2 xx 10(5)/mL final concentration) and incubated for 14 days at 37 degrees C with 5% CO(2). A 685-nm diode laser with 25-mW optical power was used as the source of irradiation. Cultures were exposed to energy densities of 0.1, 0.5, 1.0, 1.5, and 2.0 J/cm(2) before incubation (10 irradiated and 10 controls at each energy density group). Results: A higher number of CFU was observed at the dose of 1.0 J/cm(2) (control 21.3 +/- 8.5 x 10(5) cells, irradiated 40.1 +/- 10.5 x 10(5) cells, $p < 0.001$). No differences were observed in cultures exposed to doses of 0.1, 0.5, and 1.5 J/cm(2). A decreased number of CFU was demonstrated in samples exposed to the dose of 2.0 J/cm(2) (control 21.4 +/- 11.9 x 10(5) cells, $p = 0.013$). PBPC samples cryopreserved for 5 years were thawed for CFU assays and exposed to a single dose of 1.0 J/cm(2); once again the exposed group showed a higher number of CFU (control 8.8 +/- 7.8 x 10(5) cells, irradiated 18.1 +/- 13.1 x 10(5) cells, $p = 0.026$). Conclusion: Dependent upon the energy density, LLLT elevates (1.0 J/cm(2)) or decreases (2.0 J/cm(2)) the potential of long-term cryopreserved PBPC for growth of CFU in vitro.