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**Effectiveness of helium-neon laser irradiation on viability and cytotoxicity of diabetic-wounded fibroblast cells.**

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**OBJECTIVE:** This study investigated the effectiveness of helium-neon (He-Ne) laser irradiation at increasing intervals on diabetic-induced wounded human skin fibroblast cells (WS1) at a morphological, cellular, and molecular level. **BACKGROUND DATA:** The controversies over light therapy can be explained by the differing exposure regimens and models used. No therapeutic window for dosimetry and mechanism of action has been determined at the level of individual cell types, particularly in diabetic cells in vitro. **METHODS:** WS1 cells were used to simulate an in vitro wounded diabetic model. The effect of the frequency of He-Ne irradiation (632.8 nm) at a fluence of 5 J/cm<sup>2</sup> was determined by analysis of cell morphology, viability, cytotoxicity, and DNA damage. Cells were irradiated using three different protocols: they were irradiated at 30 min only; irradiated twice, at 30 min and at 24 h; or irradiated twice, at 30 min and at 72 h post-wound induction. **RESULTS:** A single exposure to 5 J/cm<sup>2</sup> 30 min post-wound induction increased cellular damage. Irradiation of cells at 30 min and at 24 h post-wound induction decreased cellular viability, cytotoxicity, and DNA damage. However, complete wound closure as well as an increase in viability and a decrease in cytotoxicity and DNA damage occurs when cells were irradiated at 30 min and at 72 h post-wound induction. **CONCLUSIONS:** Wounded diabetic WS1 cells irradiated to 5 J/cm<sup>2</sup> showed increased cellular repair when irradiated with adequate time between irradiations, allowing time for cellular response mechanisms to take effect. Therefore, the irradiation interval was shown to play an important role in wound healing in vitro and should be taken into account.