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The Viability and Migration of Hacat Cells in Response to Different Exposure Duration of 532nm Low-Level Laser

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Introduction: In the field of regenerative medicine, the spotlight is on low-level laser therapy (LLLT), which uses non-thermal photons to boost biological activity and promote tissue repair. The optimal duration for LLLT, specifically with a 532 nm green laser, continues to be a subject of ongoing debate, lacking a definitive conclusion. The purpose of this research is to determine the effect of exposure durations ranging from 30 to 300 seconds, using direct and indirect irradiation with a 532 nm green light laser at 0.1W, on the viability and migration of immortalized human keratinocytes (HaCaT cells). **Materials and Methods:** The MTT assay procedure was performed 24 hours after the irradiation to determine cell viability by measuring their ability to convert a yellow tetrazolium salt into a purple formazan dye. A higher absorption of the MTT assay suggests improved cell survival, while a lower absorbance, on the other hand, indicates an inhibitory effect on HaCaT cells. The scratch assay was conducted to observe cell migration in HaCaT cells, which involves creating a 'scratch' on a cell monolayer and monitoring cell movement into the wound area after 48 hours following irradiation. Then, the rate of cell migration was analyzed using ImageJ software for both direct and indirect irradiation. **Results:** The findings show that the 532 nm laser may have a dual effect on HaCaT cells, promoting migration while simultaneously inhibiting cell viability in response to varying exposure durations. Specifically, direct exposure for 90 seconds triggers cell migration but inhibits cell viability. In contrast, indirect irradiation requires a longer exposure time to provide a comparable effect. **Conclusion:** The findings of this study demonstrate the 532 nm laser shows a contrasting influence on HaCaT cell behavior between cell migration and cell viability. These findings emphasized these contrasting effects and their potential implications in regenerative medicine and related fields.

Keywords: Cell migration; cell viability; exposure duration; HaCaT cells; low-level laser, regenerative medicine