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Near-Infrared Light Does Not Induce DNA Damage in Human Dermal Fibroblasts

Photobiomodulation (PBM) can be used to treat a range of conditions in dermatology. PBM refers to the changes induced by red (RL, 620–700 nm) and near-infrared (NIR, 700–1440 nm) light. Despite its growing popularity, the biological impact of NIR light, especially at the cellular level, remains un-explored. Specifically, NIR light's potential to induce DNA damage remains a crucial concern in clinical settings. Light-induced DNA damage is a major contributor to skin cancer and aging. Our lab previously demonstrated that RL does not result in human dermal fibroblasts (HDFs) DNA damage. This study employed similar methods to investigate NIR light's effects. Commercially available LED-NIR (830 ± 5 nm) panels (66, 132, and 264 J/cm²) did not result in DNA damage measured by cyclobutane pyrimidine dimers and pyrimidine-6,4-pyrimidone photo-products in HDFs compared to temperature-matched controls immediately, 3 h, and 24 h following irradiation and compared to positive and negative controls. Herein, we provide a scientific basis for the clinical application of PBM, confirming its safe use in dermatological treatments. By demonstrating that NIR light does not harm DNA, our work supports PBM's broader adoption in treating skin conditions without increasing the risk of skin cancer.