

A novel in vitro model for light-induced wound healing

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Today, during the 39th Annual Meeting of the American Association for Dental Research, convening at the Walter E. Washington Convention Center in Washington, DC, lead researcher C. Millan (U.S. Army Dental Corps, Martinez, Georgia) will present a poster of a study titled "A Novel In Vitro Model for Light-Induced Wound Healing." Studies have suggested that exposure to minimal doses of blue-violet light (400-500 nm) elicits production of small amounts of reactive oxygen species (ROS), and contributes to increased mitochondrial activity and cell growth in epithelial cells. Many growth factor signaling pathways generate ROS.

In this study, Millan and other researchers involved in this study hypothesize that exposure to blue-violet light may enhance cell growth. To test this hypothesis, they developed a novel in-vitro [wound healing](#) model that allowed them to monitor the cellular responses to a single, small dose of light in [cultured cells](#).

Normal human epidermal keratinocytes (NHEK) and human gingival fibroblasts (HGF) were plated around cloning cylinders. At confluency, the cylinders were removed to create a wound. Cells were treated with a single 5 J/cm² light dose delivered by a quartz-tungsten-halogen light source. Mitochondrial succinate dehydrogenase activity was measured via a standard MTT assay, and [cell proliferation](#) was assessed using DRAQ5 DNA dye. Conditioned media were collected at each time point and used in a growth factor antibody array (RayBio®) to compare the secretion products.

Growth factor array results showed that NHEK responded to blue light exposure by increasing secretion of several growth factors including insulin-like growth factor binding protein-1, amphiregulin, epidermal growth factor and fibroblast growth factor-b. Likewise, mitochondrial dehydrogenase activity and cell proliferation were enhanced in NHEK. In contrast, HGF did not respond to blue light exposure significantly in any of the parameters tested.

These results show that NHEK cells responded robustly to a single, small dose of light by increasing their mitochondrial activity, DNA synthesis, and production of growth factors. Together, these data suggest that blue light may be useful to enhance epithelial cell growth in a wound site.

Provided by International & American Association for Dental Research

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