

Photobiomodulation and Clinical Applications

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Abstract

There are different denominations in the literature such as low level laser therapy (LLLT), low level light therapy (LLL), low intensity light therapy, and high power laser, but now we must accept a scientific term “Photobiomodulation.” Membranes cells have receptors such as integrins, growth factors that cause changes in the cytoskeleton and also in the nucleus. Chromophores, such as hemoglobin and water, are photon receptors but at the level of the mitochondria the main acceptors are the cytochromes, as in photosynthesis they are the chloroplasts. The absorption of photons, eminently in cytochrome C, activates the oxidation-reduction mechanisms and the production of cellular energy as Adenosine-Triphosphate (ATP). Through mediators (AMPc, ROS, and Protein kinase) they cause changes in the nucleus, increasing cell mobility and protein synthesis, responsible for cell regeneration. The biological response to the oxidation-reduction mechanism with the release of nitric oxide and the increase in energy (ATP) is responsible for the improvement of pain and inflammation. The regenerative response to mediating cellular signals increases the organization of collagen in the vertebral discs, reduces acute inflammation (TNF alpha), improves traumatized muscle (TN kappa B), and induces osteoblast differentiation. The current musculoskeletal indications are discopathy, synovitis, arthritis, traumatized muscle, and others. Research is ongoing on the application in brain trauma, stroke, neurodegenerative diseases, anxiety, and autoimmune inflammatory processes.

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