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The anti-inflammatory mechanism of low level laser therapy and its relevance for clinical use in physiotherapy

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[Physical Therapy Reviews](#) 07/2010; 15(4):286-293. DOI:10.1179/1743288X10Y.0000000001

ABSTRACT Background: Low level laser therapy (LLLT) is a modality that has been used by physiotherapists for more than two decades. Clinical use has largely relied on empirical data, but new evidence suggests that LLLT can trigger specific photobiological mechanisms. Objective: To review possible therapeutic windows for LLLT in inflammatory reactions. Methods: Systematic review of LLLT in studies with cell cultures and animals where inflammation is induced. Skin wound studies were excluded unless they measured the influence of drugs on LLLT effects, or made a direct comparison of LLLT and drugs in inflammation. Results: We identified 1 review, 34 cell studies, 54 animal studies and 106 skin incision studies potentially eligible for analysis. Eleven cell studies and 27 animal studies met all our inclusion criteria, and another six animal studies met our inclusion criteria for drug comparisons and LLLT interactions. There is strong evidence of an anti-inflammatory effect from LLLT, which is consistent across all 12 tested laboratory models and phases of inflammation and wavelengths between 633 and 904 nm. The magnitude of the antiinflammatory effect is not significantly different from that of non-steroidal anti-inflammatory drugs (NSAIDs), but it is slightly less than glucocorticoid steroids. There is moderate evidence that concomitant use of glucocorticoid steroid has a negative effect on LLLT mechanisms and should be avoided. Conclusion: Red and near infrared LLLT administered with mean laser output of 2.5–100 mW, irradiation times of 16–600 s and doses of 0.6–9.6 J reduces inflammation significantly, and is equally effective as NSAIDs in animal laboratory studies. Scattered evidence from human studies have found similar antiinflammatory effects of LLLT, suggesting that this mechanism may be responsible for many of the significant effects reported in clinical LLLT studies