

All Databases PubMed Nucleotide Protein Genome Structure OMIM PMC Journals Books
 Search PubMed for [Advanced Search](#)

Limits Preview/Index History Clipboard Details

Display AbstractPlus Show 20 Sort By Send to

All: 1 Review: 0

1: [Swed Dent J Suppl.](#) 2005;(172):1-63. [Links](#)

The effect of low level laser irradiation on implant-tissue interaction. In vivo and in vitro studies.

[Khadra M.](#)

Department of Oral Surgery and Oral Medicine, Faculty of Dentistry, University of Oslo, Norway.

Low-level laser therapy (LLL) is increasingly used in medicine and dentistry. It has been suggested that LLL may be beneficial in the management of many different medical conditions, including pain, wound healing and nerve injury. The present thesis is based on a series of in vivo and in vitro experimental studies investigating whether LLL has the potential to enhance titanium-implant interaction. Information about LLL effect on bone healing is fundamental to understand whether LLL may improve implant-tissue interaction. Thus in the initial study (I), the effect of LLL on bone healing and growth in rat calvarial bone defects was investigated. It was found that LLL may accelerate metabolism and/or mineralization during early bone healing. Based on these findings, study II explored the hypothesis that LLL can enhance implant integration in the rabbit tibial bone. It was shown that LLL stimulated the mechanical strength of the interface between the implant and bone after a healing period of 8 weeks. Histomorphometrical and mineral analyses showed that the irradiated implants had greater bone-to-implant contact than the controls. In the in vitro experiments, cellular responses to LLL were studied in two cell types: primary cultures of human gingival fibroblasts and human osteoblast-like cells, with special reference to attachment, proliferation, differentiation and production of transforming growth factor beta1 (TGF-beta1). The objectives of studies III & IV were to develop a standardized, reproducible in vitro model for testing a GaAlAs diode laser device and to document the influence of single or multiple doses of LLL, as a guide to defining the optimal laser dose for enhancing cell activity. A further objective was to investigate the effect of LLL on initial attachment and subsequent behaviour of human gingival fibroblasts cultured on titanium. While both multiple doses (1.5 and 3 J/cm²) and a single dose (3 J/cm²) enhanced cellular attachment, proliferation increased only after multiple doses (1.5 and 3 J/cm²). Study V concerned the response to LLL of osteoblast-like cells, derived from human alveolar bone cultured on titanium implant material. In this study LLL significantly enhanced cellular attachment. Greater cell proliferation in the irradiated groups was observed first after 96 h indicating that the cellular response is dose dependent. Osteocalcin synthesis and TGF-beta1 production were significantly stimulated on the samples exposed to 3 J/cm². The following conclusions are drawn from the results of these five studies: LLL can promote bone healing and bone mineralization and thus may be clinically beneficial in promoting bone formation in skeletal defects. It may be also used as additional treatment for accelerating implant healing in bone. LLL can modulate the primary steps in cellular attachment and growth on titanium surfaces. Multiple doses of LLL can improve LLL efficacy, accelerate the initial attachment and alter the behaviour of human gingival fibroblasts cultured on titanium surfaces. The use of LLL at the range of doses between 1.5 and 3 J/cm² may modulate the activity of cells interacting with an implant, thereby enhancing tissue healing and ultimate implant success.

PMID: 15906852 [PubMed - indexed for MEDLINE]

Display AbstractPlus Show 20 Sort By Send to

Related articles

- Effect of laser therapy on attachment, proliferation and differentiation of human o[Biomaterials. 2005]
 - Determining optimal dose of laser therapy for attachment and pro[J Biomed Mater Res A. 2005]
 - Low-level laser therapy stimulates bone-implant interaction: an expe[Clin Oral Implants Res. 2004]
 - Review* Low-level laser therapy for wound healing: mechanism and eff[Dermatol Surg. 2005]
 - Review* Underlying mechanisms at the bone-surface interface during i[J Periodontal Res. 1997]
- » See reviews... | » See all...

Recent Activity

[Turn Off](#) [Clear](#)

- The effect of low level laser irradiation on implant-tissue interaction. In vivo and in
- Wound healing in cell studies and animal model experiments by Low Level Laser
- Low level laser therapy (Classes I, II and III) for treating rheumatoid arthritis.
- Low level laser therapy (Classes I, II and III) for treating osteoarthritis.
- WITHDRAWN: Low level laser therapy (Classes III) for treating osteoarthritis.

[Write to the Help Desk](#)

[NCBI](#) | [NLM](#) | [NIH](#)

[Department of Health & Human Services](#)

[Privacy Statement](#) | [Freedom of Information Act](#) | [Disclaimer](#)