Low level laser therapy for wound healing: an update
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CRD summary
This poorly reported review concluded that low-level laser therapy does not appear to be an effective treatment for wound healing in patients with leg ulcers, pressure ulcers, or other chronic wounds. The author's conclusion appears to be supported by the evidence presented, but a lack of detail on the review process made it difficult to assess the reliability of the findings.

Authors' objectives
To update an assessment relating to the efficacy, safety and effectiveness of low-level laser therapy (LLLT) for the treatment of chronic wounds.

Searching
The Cochrane Library, EMBASE, CINAHL, PubMed and CRD (Centre for Reviews and Dissemination) databases were searched from 1999 to 2004 for relevant articles, using the search terms listed in the paper. Relevant library collections, websites of practice guidelines, regulatory agencies, evidence-based resources, Health Technology Assessment-related agency resources and grey literature were also searched.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), controlled clinical trials, non-controlled clinical trials, prospective comparative studies and retrospective studies were eligible for inclusion. Only RCTs and uncontrolled clinical trials were included in the review.

Specific interventions included in the review
Clinical studies that evaluated LLLT for the treatment of chronic wounds, specifically leg ulcers and pressure sores, were eligible for inclusion. The delivery of LLLT differed between the included studies in terms of laser type, wavelength, dosage or irradiance, beam divergence, spot size, frequency and duration of treatment.

Participants included in the review
No a priori criteria were reported. The included studies encompassed a variety of populations including wound care in patients with pressure ulcers, venous leg ulcers, post-surgical wounds, and ulcers of variable origin.

Outcomes assessed in the review
No a priori criteria were reported. Studies that reported closure of ulcer, change in wound size or healing rate, self-reported pain, bacterial count, patient satisfaction, recurrent ulceration, ulcer volume and granulation were included in the review.

How were decisions on the relevance of primary studies made?
The author did not state how the papers were selected for the review, or how many reviewers performed the selection process.

Assessment of study quality
The authors evaluated the included studies according to a classification scheme by Jovell and Rubio that commented on quality of evidence (see Other Publications of Related Interest no.1). In addition, detailed comments were made on the methodological quality of the individual studies. The author did not state how the papers were assessed for quality, or how many reviewers performed the quality assessment.
Data extraction
The author did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
How were the studies combined?
The studies were combined in a narrative format.

How were differences between studies investigated?
No statistical analysis of heterogeneity was conducted. Differences between the studies were detailed in the report.

Results of the review
Nine studies were included: 6 RCTs (n=269) and 3 non-controlled clinical trials (n=136).

Five of the 6 RCTs reported no therapeutic benefit of laser therapy compared with conventional wound care. Two RCTs were reported to have sufficient study quality, neither of which showed a beneficial treatment effect of laser therapy. The results from the uncontrolled studies showed that between 37 and 100% of ulcers treated with LLLT healed but, owing to methodological limitations, it was unclear to what extent the healing was attributable to laser treatment.

Authors' conclusions
Although LLLT appeared safe, the results did not indicate that it was an effective treatment for wound healing in patients with leg ulcers, pressure ulcers, or other chronic wounds. This supported the results of an earlier review by Schneider and Hailey (see Other Publications of Related Interest no.2). Further well-conducted research is needed to assess whether LLLT is effective, and what the optimal patient populations and treatment schedules might be. Alternative therapies, such as ultrasound or electrical stimulation, should be considered as adjunctive treatments to conventional therapy before LLLT.

CRD commentary
This review addressed a clear question but limited inclusion and exclusion criteria were reported. Several sources, including unpublished material, were searched for relevant trials. However, the author did not report whether any language restrictions were applied in the search strategy, thus it was possible that studies might have been missed and bias introduced. The methods used to select the studies and extract the data were not described; the possibility of reviewer error or bias could not, therefore, be assessed. The quality of the primary studies was assessed and commented on, although the application of the this assessment was not transparent. The broad range of laser treatments and patients included in the review precluded the pooling of data and, consequently, a narrative summary was used; this was appropriate.

The author's conclusion appears to follow from the results, but lack of detail on the review process made it difficult to confidently assess the reliability of the review.

Implications of the review for practice and research
Practice: The author stated that regional clinical practice should not be changed to include LLLT. LLLT should be restricted to patients with chronic ulcers resistant to conventional therapy and should be for research purposes only.

Research: The author put forward a number of guidelines pertaining to study design, protocol, patient selection and clinical outcomes for future research to consider.

Bibliographic details

**Original Paper URL**

**Other publications of related interest**

**Indexing Status**
Subject indexing assigned by CRD

**MeSH**
Low-Level Light Therapy; Wound Healing /radiation effects

**AccessionNumber**
12005008065

**Date bibliographic record published**
31/12/2005

**Date abstract record published**
31/12/2005

**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.