



Detta är ett svar från SBU:s Upplysningstjänst 16 april 2018. SBU:s Upplysningstjänst svarar på avgränsade medicinska frågor. Svaret bygger inte på en systematisk litteraturoversikt utförd av SBU. Därför kan resultaten av litteratursökningen vara ofullständiga. Kvaliteten på ingående studier har inte bedömts. Detta svar har tagits fram av SBU:s kansli och har inte granskats av SBU:s nämnd.

Low-level laser therapy (LLLT) vid oral mukosit orsakad av cancerbehandling

Oral mukosit, inflammation i munslemhinnan, kan bero på en direkt skada på slemhinnan, en infektion eller biverkningar av en cancerbehandling med cytostatika eller strålning. Low-level laser therapy (LLLT) har föreslagits ha en antiinflammatorisk, smärtlindrande och vävnadsuppbyggande effekt genom att påverka olika processer i de celler och vävnader som exponeras för LLLT.

Fråga:

Finns det vetenskapligt stöd för att LLLT kan lindra oral mukosit som orsakats av cancerbehandling?

Sammanfattning

Upplysningstjänsten har identifierat 6 översikter och 14 primärstudier som studerat effekten av LLLT på oral mukosit orsakad av en cancerbehandling med antingen cytostatika eller strålning eller både cytostatika och strålning. Författarna till de flesta av dessa studier drar slutsatsen att LLLT har en lindrande effekt på oral mukosit, när den ges i samband med cancerbehandlingen. Flertalet av översikterna och primärstudierna påpekar dock att effekten av LLLT behöver utvärderas i fler studier för att bekräfta om LLLT är effektivt och säkert.

SBU har inte tagit ställning i sakfrågan eftersom vi inte har bedömt de enskilda studiernas kvalitet eller vägt samman resultaten. Här redovisar vi därför endast de enskilda författarnas slutsatser.

Bakgrund

Oral mukosit i samband med cancerbehandling uppstår oftast 5–7 dagar efter att man påbörjat en cytostatikabehandling eller 12–17 dagar efter påbörjad strålbehandling. Den kliniska bilden av oral mukosit varierar från lätt rodnad till kraftigt inflammerad slemhinna med generell sårbildning. I svårare fall är mukositen så smärtsam att den medför svårigheter att äta, dricka och tala. Flera olika skalor används för att gradera svårighetsgraden av den orala mukositen. WHO-skalan är baserad på patientens upplevelse av smärta i munhålan, uppkomst av rodnad, vita eller röda förändringar eller sår och patientens förmåga att kunna



äta och dricka. Andra skalor som används är RTOG (radiation therapy oncology group), NCI-CTC (National cancer institute common terminology criteria), OMAS (oral mucositis assessment), OMI (oral mucositis index), EORTC (European Organization for Research and Treatment of Cancer scale), PROMS (patient-reported oral mucositis symptom), eller Tardieu mukositis-skalan.

Oral mukositis vid cancerbehandling kan vara mycket smärtsam. I allvarliga fall måste cancerbehandlingen avbrytas för att patienten ska kunna äta eller dricka. Behandlingen av oral mukositis är därför främst inriktad på lokal eller systemisk smärtlindring eller munvård i smärt- och infektionsförebyggande syfte.

Low-level laser therapy (LLLT) kallas också terapeutisk eller medicinsk laser och innefattar icke-kirurgiska lasrar som alstrar ljus med en konstant våglängd.

LLLT har föreslagits ha en antiinflammatorisk, smärtlindrande och vävnadsuppbyggande effekt genom att påverka olika processer i de celler och vävnader som exponeras för LLLT. Behandling med LLLT utförs genom att en prob som avger ljus trycks mot eller hålls nära det område som ska behandlas. Vid oral behandling kan lasern appliceras antingen inuti eller utanför munhålan.

Avgränsningar

Upplysningstjänsten har gjort sökningar (se avsnittet Litteratursökning) i databaserna Pubmed, Cochrane, Embase och Centre for Reviews and Dissemination. För att en systematisk översikt eller primärstudie skulle inkluderas krävdes att artikeln var peer-review-granskad och publicerad på engelska, norska, danska eller svenska.

Resultat från sökningen

Upplysningstjänstens litteratursökning resulterade i totalt 404 artiklar. En person läste alla artikelsammanfattningar. Av dessa bedömde vi att 89 artiklar skulle kunna vara relevanta. Dessa lästes i fulltext. 6 systematiska översikter och 14 primärstudier som inte inkluderats i någon av de 6 översikterna ingår i svaret. De systematiska översikterna inkluderade mellan 2 och 24 primärstudier av vilka åtskilliga ingår i fler än en av översikterna. De artiklar som inte ingår i svaret exkluderades på grund av att de inte var relevanta för frågeställningen eller för att de redan var inkluderade i en systematisk översikt som ingår i det här svaret. Observera att vi inte bedömde kvaliteten på varken översikterna eller de inkluderade studierna. Det är därför möjligt att flera av studierna kan ha lägre kvalitet än vad SBU inkluderar i sina ordinarie utvärderingar.

De systematiska översikterna och primärstudierna som inkluderas i detta svar innefattar antingen barn, vuxna eller både barn och vuxna som genomgått antingen cytostatikabehandling, strålbehandling eller både cytostatikabehandling



och strålning och samtidigt fått LLLT i förebyggande eller behandlande syfte för oral mukositis. Strålbehandlingen har givits lokalt mot huvud och hals inklusive munhålan och inneburit att den orala slemhinnan har påverkats av strålning. Cytostatikabehandlingen har givits till patienter vid behandling av leukemi, solid tumör eller inför en stamcellsbehandling (hematopoietic stem cell therapy, HSCT).

Nedan redovisar vi de inkluderade systematiska översikterna och primärstudierna var för sig. De är uppdelade efter om studierna har undersökt effekten av LLLT på individer som genomgår strålbehandling, cytostatikabehandling eller både cytostatika- och strålbehandling.

Systematiska översikter

LLLT vid cytostatika och/eller strålbehandling

Fem systematiska översikter identifierades som undersökt effekten av LLLT i förebyggande eller behandlande syfte av oral mukositis som orsakats av antingen cytostatika, strålbehandling eller både cytostatika och strålbehandling.

Tabell 1. Systematic reviews: LLLT for the prevention and treatment of oral mucositis in

Aim/included studies	Population /intervention/control	Outcome
Oberoi et al 2014 [1]		
To determine whether prophylactic low laser therapy reduces the risk of severe mucositis as compared to placebo or no therapy. 18 RCT	In total 1144 children or adults with cancer or undergoing hematopoietic stem cell transplantation. Intervention: LLLT (632-1064 nm), intraoral or extraoral, before and/or during radiotherapy or chemotherapy. Control: placebo, no treatment or treatment as usual.	Oral mucositis (assessed with WHO, RTOG, NCI-CTC, Tardieu or OMAS scale) Pain (assessed with VAS-scale or intake of opioid analgesia)
Authors' conclusion: "Prophylactic LLLT reduced severe mucositis and pain in patients with cancer and hematopoietic stem cell transplantation recipients. Future research should identify the optimal characteristics of LLLT and determine feasibility in the clinical setting"		



Fekrazad and Chiniforush 2014 [2]		
<p>The aim of this review study was to assess the effect of low level laser therapy for prevention and management of oral mucositis in cancer patients.</p> <p>24 primary studies</p>	<p>In total 1127 children or adults with cancer or undergoing hematopoietic stem cell transplantation.</p> <p>Intervention: LLLT (632.8-830 nm) before and/or during radiotherapy or chemotherapy.</p> <p>Control: unclear</p>	<p>Oral mucositis (method not specified)</p> <p>Pain (method not specified)</p> <p>Quality of life</p>
<p>Authors' conclusion:</p> <p>“LLLT is a safe approach for management and prevention of oral mucositis”</p>		
Figueiredo et al 2013 [3]		
<p>To perform a systematic review and meta-analysis of the effectiveness of laser therapy in the prevention of oral mucositis in patients undergoing oncotherapy.</p> <p>12 RCT</p>	<p>In total 527 children or adults with cancer or undergoing hematopoietic stem cell transplantation.</p> <p>Intervention: LLLT (632-1064 nm) before and/or during radiotherapy or chemotherapy.</p> <p>Control: placebo, no treatment or treatment as usual.</p>	<p>Oral mucositis (assessed with WHO, NCI or Tardieu scale)</p>
<p>Authors' conclusion:</p> <p>“The data demonstrated the significant prophylactic effect of oral mucositis grade ≥ 3 in patients undergoing Laser therapy. Further studies, with larger sample sizes, are needed for better evaluation of Laser therapy’s prophylactic effect on oral mucositis grade ≥ 3”</p>		
Bjordal et al 2011 [4]		
<p>The purpose of this study is to review the effects of LLLT in the prevention and treatment of cancer therapy-induced oral mucositis.</p> <p>11 RCT</p>	<p>In total 415 children or adults with cancer or undergoing hematopoietic stem cell transplantation.</p> <p>Intervention: LLLT (632-1064 nm) before and/or during radiotherapy or chemotherapy.</p> <p>Control: placebo</p>	<p>Oral mucositis (assessed with WHO or OMI scale)</p> <p>Pain (assessed with different scales)</p> <p>Side effects</p>
<p>Authors' conclusion: “There is consistent evidence from small high-quality studies that red and infrared LLLT can partly prevent development of cancer therapy-induced oral mucositis: LLLT also significantly reduced pain, severity and duration of symptoms in patients with cancer therapy-induced oral mucositis”.</p>		



Clarkson och medförfattare 2010 [5]		
To assess the effectiveness of interventions for treating oral mucositis or its associated pain in patients with cancer receiving chemotherapy or radiotherapy or both. 32 RCT of which 2 studies investigate LLLT	In total 98 children or adults with cancer or undergoing hematopoietic stem cell transplantation. Intervention: LLLT before and/or during radiotherapy or chemotherapy. Control: placebo	Oral mucositis (assessed with NCI or EORTC scale)
Authors' conclusion: "There is limited evidence from two small trials that LLLT reduces the severity of the mucositis".		

RCT = randomized controlled trial; LLLT = low level laser therapy; VAS = visual analogue scale; RTOG= Radiation Therapy Oncology Group; NCI-CTC = National Cancer Institute common terminology criteria; OMAS = oral mucositis assessment; EORTC = European Organization for Research and Treatment of Cancer scale; OMI = oral mucositis index

LLLT vid cytostatikabehandling

En systematisk översikt identifierades som undersökt effekten av LLLT vid behandling av oral mukositis som orsakats av cytostatikabehandling.

Tabell 2. Systematic reviews: LLLT for the treatment of chemotherapy induced oral mucositis

Aim/included studies	Population /intervention/control	Outcome
Chaveli-López and Bagán-Sebastian 2016 [6]		
The present study was designed to examine the main treatment options for oral mucositis due to chemotherapy found in the scientific literature. 96 articles out of which 5 investigated LLLT. 4 RCT and 1 CCT without control group	In total 147 children or adults with oral mucositis induced by chemotherapy. Intervention: LLLT (630-830 nm) before and/or during or after chemotherapy. Control: placebo, LED phototherapy, treatment as usual	Oral mucositis (assessed with WHO or NCI scale) Pain (assessed with VAS scale)
Authors' conclusion: "Very few interventions of confirmed efficacy are available for the management of oral mucositis due to chemotherapy. However, according to the literature, the use of palifermin, cryotherapy and lower power laser offers benefits, reducing the incidence and severity of oral mucositis-though further studies are needed to confirm the results obtained"		

RCT = randomized controlled trial; LLLT = low level laser therapy; CCT = controlled clinical trial; LED = light emitting diode; NCI = National Cancer Institute



Primärstudier

LLLT vid cytostatikabehandling

Utöver de primärstudier som inkluderats i översikterna beskrivna i tabell 1 eller tabell 2, identifierades 9 primärstudier som undersökt effekten av LLLT i förebyggande eller behandlande syfte för oral mukositis som orsakats av cytostatikabehandling.

Tabell 3. Primary studies: LLLT for the prevention and treatment of chemotherapy induced oral mucositis

Aim/ study design	Population /intervention/control	Outcome
Amadori et al 2016 [7]		
The aim of this study was to verify if low-level laser therapy could be useful to reduce chemotherapy-related oral mucositis grading and pain in childhood undergoing chemotherapy. RCT	In total 123 children chemotherapy-induced oral mucositis. Intervention: LLLT (830 nm, intraoral) starting on the day of diagnosis of oral mucositis and continued for another 3 consecutive days Control: placebo	Oral mucositis (assessed with WHO scale) Pain (assessed with VAS scale)
Authors' conclusion: "This study demonstrated the efficacy of LLLT in reducing pain due to chemotherapy-induced oral mucositis in children, while no significant benefit was noted in reducing oral mucositis grade"		
Ferreira et al 2016 [8]		
The purpose of this study is to evaluate the effectiveness of LLLT therapy for the prevention of oral mucositis in patients undergoing HSCT. RCT	In total 35 adults undergoing HSCT Intervention: LLLT (650 nm, intraoral) was applied from the first to the fifth day of pre-transplant conditioning. Control: placebo	Oral mucositis (assessed with WHO scale) Pain (assessed with VAS-scale)
Authors' conclusion: "LLLT proved effective for the prevention of severe oral mucositis and intense oral pain in patients submitted to HSCT"		



Soto et al 2015 [9]		
<p>The objective of this study was to evaluate the use of a combined protocol of intraoral and extraoral LLLT in children undergoing hematopoietic stem cell transplantation (HSCT). A follow up study</p>	<p>In total 12 children undergoing HSCT Intervention: LLLT (685 nm intraoral and 830 nm extraoral) began on the first day of chemotherapy and ended on the day of healing or engraftment</p>	<p>Oral mucositis (assessed with NCI scale)</p>
<p>Authors' conclusion: "This study indicates that a combined protocol of intraoral and extraoral application of LLLT can reduce the severity of oral mucositis in pediatric patients undergoing HSCT. Randomized double-blind clinical trials with a larger number of subjects are needed to further test such combined protocols"</p>		
Eduardo et al 2015 [10]		
<p>The aim of this study was to provide a prospective description of oral mucositis severity in HSCT pediatric patients undergoing specialized oral care and LLLT, as well as to discuss the feasibility of applying these tools during HSCT. A follow up study</p>	<p>In total 51 children undergoing hematopoietic stem cell transplantation. Intervention: LLLT (660 nm, intraoral) daily from the first day after chemotherapy until engraftment.</p>	<p>Oral mucositis (assessed with WHO scale) Pain (opioid analgesic prescriptions)</p>
<p>Authors' conclusion: "We found that good clinical outcomes were obtained using this therapy, mainly in regard to control of oral mucositis severity and pain reduction in the oral cavity."</p>		
Silva et al 2015 [11]		
<p>The aim of this study was to assess the impact of low-level laser therapy (LLLT) on oral mucositis and quality of life of HSCT patients. RCT</p>	<p>In total 39 young adults and adults undergoing HSCT Intervention: LLLT (660 nm, intraoral) from the first day of chemotherapy until day 7 post-HSCT Control: no LLLT treatment</p>	<p>Oral mucositis (assessed with WHO scale) Quality of life (assessed with functional assessment of cancer therapy-bone marrow transplantation (FACT-BMT), oral health impact profile (OHIP-14))</p>
<p>Authors' conclusion: "LLLT did not influence the oral and general health-related quality of life of patients undergoing HSCT, although it was clinically effective in reducing the severity of chemotherapy-induced oral mucositis"</p>		



Bezinelli et al 2015 [12]		
Our objective was to determine the impact of mucositis on quality of life of patients subjected to HSCT treated with LLLT. A follow up study	In total 69 children and adults undergoing HSCT Intervention: LLLT (660 nm, intraoral) one day after the start of chemotherapy. The laser irradiation sessions are ceased once the bone marrow has integrated No control group	Oral mucositis (assessed with WHO scale and PROMS) Quality of life (assessed with oral health impact profile (OHIP-14))
Authors' conclusion: "The study has shown that quality of life improves over time in patients undergoing LLLT therapy for mucositis prevention"		
De Castro et al 2013 [13]		
The aim of this study was to evaluate the influence of LLLT on the prevention and treatment of oral mucositis in pediatric patients taking methotrexate. CCT	In total 40 children with acute lymphoblastic leukemia taking methotrexate Intervention 1: LLLT (660 or 830 nm, intraoral) for 5 days, beginning on the first day of chemotherapy Intervention 2: LLLT (660 or 830 nm, intraoral) after the development of oral mucositis	Oral mucositis (assessed with WHO scale) Pain (assessed with VAS scale)
Authors' conclusion: "Prophylactic laser produced a better outcome than when patients did not receive any preventive intervention, and red laser (660 nm) was better than infrared (830 nm) in the prevention and treatment of oral mucositis"		
Arbabi-Kalati et al 2013 [14]		
The present study was undertaken to evaluate the effect of LLLT on the prevention of mucositis, xerostomia and pain as a result of chemotherapy. RCT	In total 48 adults undergoing chemotherapy for lymphoma, skin cancer, breast-, lung- or gastrointestinal tumors. Intervention: LLLT (630 nm, intra-and extraoral) was applied prior to each episode of chemotherapy Control: placebo	Oral mucositis (assessed with WHO-scale) Pain (assessed with VAS-scale) Xerostomi (unclear method)
Authors' conclusion: "It can be concluded that low-power laser might decrease the intensity of mucositis"		
Cauwels and Martens 2011 [15]		
The goal of this pilot study was to investigate the capacity of pain relief and wound healing	In total 16 children suffering from chemotherapy-induced oral mucositis. Most children	Oral mucositis (assessed with WHO scale)



of LLLT in chemotherapy-induced oral mucositis in paediatric oncology population group. A follow up study	were diagnosed with leukemia and lymphoma. Intervention: LLLT (830 nm) every 48 hours until complete healing of lesion	Pain (assessed with VAS scale, faces pain scale)
<p>Authors' conclusion: "The three main effects applicable to LLLT are: 1) an immediate analgesic effect, 2) an anti-inflammatory impact and 3) a faster wound healing. Based on these properties and on the results of other studies it can be concluded that in the present study these objectives were obtained with the GaAlAs 830 nm diode laser"</p>		

RCT = randomized controlled trial; LLLT = low level laser therapy; CCT = controlled clinical trial; HSCT = hematopoietic stem cell therapy; VAS = visual analogue scale; PROMS = patient-reported oral mucositis symptom; NCI = National Cancer Institute

LLLT vid lokal strålbehandling

Utöver de primärstudier som inkluderats i översikterna beskrivna i Tabell 1, identifierades 6 primärstudier som undersökt effekten av LLLT i förebyggande eller behandlande syfte för oral mukositis som orsakats av lokal strålbehandling.

Tabell 4. Primary studies: LLLT for the prevention and treatment of radiation induced oral mucositis

Aim/ study design	Population /intervention/control	Outcome
González-Arriagada et al 2017 [16]		
The aim of this study was to determine the efficacy of LLLT for management of acute collateral effects in patients undergoing head and neck radiotherapy, with emphasis on oral mucositis and its morbidity. An observational retrospective case-control study with control group	In total 216 adults undergoing head and neck radiotherapy. Intervention: LLLT (660 nm) started on the same day as the radiotherapy, 30 min before the radiotherapy, 3 times a week Control: no LLLT	Oral mucositis (assessed with WHO scale) Side effects (xerostomia, candidiasis, dermatitis, severe trismus, dysgeusia)
<p>Authors' conclusion: "The introduction of laser therapy in the supportive care for patients undergoing head and neck radiotherapy showed benefits for the patient and the medical system, reducing morbidity and costs associated with side-effects"</p>		



Antunes et al 2017 [17]		
<p>The impact of LLLT to prevent oral mucositis in patients treated with exclusive chemoradiation therapy remains unknown. This study evaluated the overall disease-free and progression-free survival of these patients. RCT</p>	<p>In total 94 adults diagnosed with nasopharynx, oropharynx, and hypopharynx cancer with carcinoma of oral cavity. Intervention: LLLT (660 nm, intraoral) performed daily before application of radiotherapy, in average for 45,7 days Control: placebo</p>	<p>Oral mucositis (assessed with NCI-CTC scale) Pain (assessed with VAS scale) Body mass index</p>
<p>Authors' conclusion: "This is the first study to suggest that LLLT may improve survival of head and neck cancer patients treated with chemoradiotherapy. Further studies, with a larger sample, are necessary to confirm our findings"</p>		
Gautam et al 2015 [18]		
<p>This study was done to evaluate the effects of LLLT for the prevention and treatment of radiation induced oral mucositis in elderly head and neck cancer patients. RCT</p>	<p>In total 46 adults undergoing radiotherapy for head and neck cancer Intervention: LLLT (632,8 nm, intraoral) daily just before application of radiotherapy, 5 sessions per week Control: placebo</p>	<p>Oral mucositis (assessed with RTOG scale) Pain (assessed with VAS scale) Weight loss Need for morphine analgesics</p>
<p>Authors' conclusion: "LLLT decreased the severity of oral mucositis and oral pain in elderly head and neck cancer patients. Also, lesser weight loss, morphine analgesic use and radiation break happened in the laser group"</p>		
Oton-Leite et al 2015 [19]		
<p>The aim of this study was to evaluate the effect of LLLT in the severity of oral mucositis in patients with head and neck cancer and on the release of salivary inflammatory mediators. RCT</p>	<p>In total 60 adults undergoing radiotherapy for head and neck cancer Intervention: LLLT (660 nm, intraoral) was performed at the first day of radiotherapy and the following sessions occurred three times a week just before each session of radiotherapy Control: sham irradiation</p>	<p>Oral mucositis (assessed with WHO and NCI scales) Inflammatory mediators in the saliva</p>
<p>Authors' conclusion: "These findings demonstrated that LLLT was effective in reducing the severity of chemoradiotherapy-induced oral mucositis and was associated with the reduction of inflammation and repair"</p>		



Arora et al 2008 [20]		
<p>The objective of this study was to evaluate the efficacy of low-level lasers for the prevention and treatment of radiotherapy-induced oral mucositis in oral cancer patients. A single-center prospective controlled study</p>	<p>In total 24 adults with oral cancer undergoing radiotherapy. Intervention: LLLT (632,8 nm, intraoral) daily before radiotherapy. Initially during the first 8 days. Control: no LLLT</p>	<p>Oral mucositis (assessed with RTOG scale) Pain (assessed with intake of NSAIDs, morphine, numeric rating scale, WHO scale)</p>
<p>Authors' conclusion: "Laser therapy applied prophylactically during radiotherapy can reduce the severity of oral mucositis, severity of pain, and functional impairment"</p>		

RCT = randomized controlled trial; LLLT = low level laser therapy; VAS = visual analogue scale; RTOG = Radiation Therapy Oncology Group; NCI-CTC = National Cancer Institute common terminology criteria; NSAID = non-steroidal anti-inflammatory drug

Projektgrupp

Detta svar är sammanställt av Helena Domeij och Sally Saad vid SBU.



Litteratursökning

Pubmed 2017-10-16		
Population: Oral mucositis in patients with cancer receiving chemotherapy or radiotherapy or both		
Intervention: LLLT		
	Search terms	Items found
1.	((("Mucositis"[Mesh] OR Mucos*[tiab] OR candi*[tiab] OR fung*[tiab]) AND oral) OR "Stomatitis"[Mesh] OR "Stomatitis"[tiab] OR mycosis[tiab] OR mycotic[tiab] OR thrush[tiab])	103519
2.	neoplasms"[MeSH Terms] OR "Radiotherapy"[Mesh] OR "Chemotherapy, Adjuvant"[Mesh] OR "Leukemia"[Mesh] OR "Lymphoma"[Mesh] OR neoplasm[tiab] OR neoplasms[tiab] OR neoplastic[tiab] OR cancer[tiab] OR cancers[tiab] OR carcinoma[tiab] OR carcinomas[tiab] OR carcinomic[tiab] OR tumor[tiab] OR tumors[tiab] OR tumour[tiab] OR tumours[tiab] OR leukemia[tiab] OR leukaemia[tiab] OR leukemias[tiab] OR leukaemias[tiab] OR neutropenia[tiab] OR neutropenic[tiab] OR lymphoma[tiab] OR lymphomas[tiab] OR malignant[tiab] OR adenocarcinoma[tiab] OR adenocarcinomas[tiab] OR radiotherapy[tiab] OR radiotherapies[tiab] OR radiation[tiab] OR irradiation[tiab] OR radiochemotherapy[tiab] OR radiochemotherapies[tiab] OR chemotherapy[tiab] OR chemotherapies[tiab] OR cytotoxic[tiab] OR cytostatic[tiab]	4131814
3.	"low-level light therapy"[MeSH Terms] OR "low-level light therapy"[tiab] OR "low-level laser therapy"[tiab] OR "low-level light therapies"[tiab] OR "low-level laser therapies"[tiab] OR "Photobiomodulation Therapy"[tiab] OR "Photobiomodulation Therapies"[tiab] OR LLLT[tiab] OR "Low Power Laser Therapy"[tiab] OR "Low Power Laser Therapies"[tiab] OR "Low Power Laser Irradiation"[tiab] OR "Laser Biostimulation"[tiab] OR "Laser Phototherapy"[tiab]	5390
4.	1 AND 2 AND 3	166
5.	4 AND systematic[SB]	16
6.	4 AND "Clinical Trial"[sb]	43
Final	Result	43

The search result, usually found at the end of the documentation, forms the list of abstracts

[MeSH] = Term from the Medline controlled vocabulary, including terms found below this term in the MeSH hierarchy

[MeSH:NoExp] = Does not include terms found below this term in the MeSH hierarchy

[MAJR] = MeSH Major Topic

[TIAB] = Title or abstract

[TI] = Title

[AU] = Author

[TW] = Text Word

Systematic[SB] = Filter for retrieving systematic reviews

* = Truncation

“ “ = Citation Marks; searches for an exact phrase



Cohrane Library via Wiley 2017-10-16		
Population: Oral mucositis in patients with cancer receiving chemotherapy or radiotherapy or both		
Intervention: LLLT		
	Search terms	Items found
1.	(("Mucositis"[Mesh] OR Mucos*:ti,ab,kw OR candi*:ti,ab,kw OR fung*:ti,ab,kw) AND oral) OR "Stomatitis"[Mesh] OR "Stomatitis":ti,ab,kw OR mycosis:ti,ab,kw OR mycotic:ti,ab,kw OR thrush:ti,ab,kw	10373
2.	"neoplasms"[MeSH Terms] OR "Radiotherapy"[Mesh] OR "Chemotherapy, Adjuvant"[Mesh] OR "Leukemia"[Mesh] OR "Lymphoma"[Mesh] OR neoplasm:ti,ab,kw OR neoplasms:ti,ab,kw OR neoplastic:ti,ab,kw OR cancer:ti,ab,kw OR cancers:ti,ab,kw OR carcinoma:ti,ab,kw OR carcinomas:ti,ab,kw OR carcinomic:ti,ab,kw OR tumor:ti,ab,kw OR tumors:ti,ab,kw OR tumour:ti,ab,kw OR tumours:ti,ab,kw OR leukemia:ti,ab,kw OR leukaemia:ti,ab,kw OR leukemias:ti,ab,kw OR leukaemias:ti,ab,kw OR neutropenia:ti,ab,kw OR neutropenic:ti,ab,kw OR lymphoma:ti,ab,kw OR lymphomas:ti,ab,kw OR malignant:ti,ab,kw OR adenocarcinoma:ti,ab,kw OR adenocarcinomas:ti,ab,kw OR radiotherapy:ti,ab,kw OR radiotherapies:ti,ab,kw OR radiation:ti,ab,kw OR irradiation:ti,ab,kw OR radiochemotherapy:ti,ab,kw OR radiochemotherapies:ti,ab,kw OR chemotherapy:ti,ab,kw OR chemotherapies:ti,ab,kw OR cytotoxic:ti,ab,kw OR cytostatic:ti,ab,kw	165398
3.	"low-level light therapy"[MeSH Terms] OR "low-level light therapy":ti,ab,kw OR "low-level laser therapy":ti,ab,kw OR "low-level light therapies":ti,ab,kw OR "low-level laser therapies":ti,ab,kw OR "Photobiomodulation Therapy":ti,ab,kw OR "Photobiomodulation Therapies":ti,ab,kw OR LLLT:ti,ab,kw OR "Low Power Laser Therapy":ti,ab,kw OR "Low-Power Laser Therapies":ti,ab,kw OR "Low Power Laser Irradiation":ti,ab,kw OR "Laser Biostimulation":ti,ab,kw OR "Laser Phototherapy":ti,ab,kw	1776
4.	1 AND 2 AND 3	78
Final	Result	78

The search result, usually found at the end of the documentation, forms the list of abstracts

[AU] = Author

[MAJR] = MeSH Major Topic

[MeSH] = Term from the Medline controlled vocabulary, including terms found below this term in the MeSH hierarchy

[MeSH:NoExp] = Does not include terms found below this term in the MeSH hierarchy

Systematic[SB] = Filter for retrieving systematic reviews

[TI] = Title

[TIAB] = Title or abstract

[TW] = Text Word

* = Truncation

“ “ = Citation Marks; searches for an exact phrase

CDSR = Cochrane Database of Systematic Review

CENTRAL = Cochrane Central Register of Controlled Trials, “trials”

CRM = Method Studies

DARE = Database Abstracts of Reviews of Effects, “other reviews”

EED = Economic Evaluations

HTA = Health Technology Assessments



Embase via embase.com 2017-10-16		
Population: mukositis hos cancerpatienter		
Intervention: LLLT		
Embase_sökstrategi		
	Search terms	Items found
1.	((Mucos*:ti,ab OR candi*:ti,ab OR fung*:ti,ab) AND oral:ti,ab) OR 'stomatitis'/exp OR "Stomatitis":ti,ab OR mycosis:ti,ab OR mycotic:ti,ab OR thrush:ti,ab OR 'oral mucositis'/exp	134836
2.	"'neoplasm'/exp OR 'radiotherapy'/exp OR 'adjuvant chemotherapy'/exp OR 'leukemia'/exp OR 'lymphoma'/exp OR neoplasm:ti,ab OR neoplasms:ti,ab OR neoplastic:ti,ab OR cancer:ti,ab OR cancers:ti,ab OR carcinoma:ti,ab OR carcinomas:ti,ab OR carcinomic:ti,ab OR tumor:ti,ab OR tumors:ti,ab OR tumour:ti,ab OR tumours:ti,ab OR leukemia:ti,ab OR leukaemia:ti,ab OR leukemias:ti,ab OR leukaemias:ti,ab OR neutropenia:ti,ab OR neutropenic:ti,ab OR lymphoma:ti,ab OR lymphomas:ti,ab OR malignant:ti,ab OR adenocarcinoma:ti,ab OR adenocarcinomas:ti,ab OR radiotherapy:ti,ab OR radiotherapies:ti,ab OR radiation:ti,ab OR irradiation:ti,ab OR radiochemotherapy:ti,ab OR radiochemotherapies:ti,ab OR chemotherapy:ti,ab OR chemotherapies:ti,ab OR cytotoxic:ti,ab OR cytostatic:ti,ab	5362035
3.	'low level laser therapy'/exp OR "low-level light therapy":ti,ab OR "low-level laser therapy":ti,ab OR "low-level light therapies":ti,ab OR "low-level laser therapies":ti,ab OR "Photobiomodulation Therapy":ti,ab OR "Photobiomodulation Therapies":ti,ab OR LLLT:ti,ab OR "Low Power Laser Therapy":ti,ab OR "Low-Power Laser Therapies":ti,ab OR "Low Power Laser Irradiation":ti,ab OR "Laser Biostimulation":ti,ab OR "Laser Phototherapy":ti,ab	18377
4.	1 AND 2 AND 3	368
5.	4 AND ([cochrane review]/lim OR [systematic review]/lim OR [meta analysis]/lim)	26
6.	4 AND ([controlled clinical trial]/lim OR [randomized controlled trial]/lim)	40
Final	Result	40

/de = Term from the EMTREE controlled vocabulary

/exp = Includes terms found below this term in the EMTREE hierarchy

/mj = Major Topic

:ab = Abstract

:au = Author

:ti = Article Title

:ti,ab = Title or abstract

* = Truncation

' ' = Citation Marks; searches for an exact phrase



Referenser

1. Oberoi S, Zamperlini-Netto G, Beyene J, Treister NS, Sung L. Effect of prophylactic low level laser therapy on oral mucositis: a systematic review and meta-analysis. *PLoS One* 2014;9:e107418.
2. Fekrazad R, Chiniforush N. Oral mucositis prevention and management by therapeutic laser in head and neck cancers. *J Lasers Med Sci* 2014;5:1-7.
3. Figueiredo AL, Lins L, Cattony AC, Falcao AF. Laser therapy in the control of oral mucositis: a meta-analysis. *Rev Assoc Med Bras (1992)* 2013;59:467-74.
4. Bjordal JM, Bensadoun RJ, Tuner J, Frigo L, Gjerde K, Lopes-Martins RA. A systematic review with meta-analysis of the effect of low-level laser therapy (LLLT) in cancer therapy-induced oral mucositis. *Support Care Cancer* 2011;19:1069-77.
5. Clarkson JE, Worthington HV, Furness S, McCabe M, Khalid T, Meyer S. Interventions for treating oral mucositis for patients with cancer receiving treatment. *Cochrane Database Syst Rev* 2010:Cd001973.
6. Chaveli-Lopez B, Bagan-Sebastian JV. Treatment of oral mucositis due to chemotherapy. *J Clin Exp Dent* 2016;8:e201-9.
7. Amadori F, Bardellini E, Conti G, Pedrini N, Schumacher RF, Majorana A. Low-level laser therapy for treatment of chemotherapy-induced oral mucositis in childhood: a randomized double-blind controlled study. *Lasers Med Sci* 2016;31:1231-6.
8. Ferreira B, da Motta Silveira FM, de Orange FA. Low-level laser therapy prevents severe oral mucositis in patients submitted to hematopoietic stem cell transplantation: a randomized clinical trial. *Support Care Cancer* 2016;24:1035-42.
9. Soto M, Lalla RV, Gouveia RV, Zecchin VG, Seber A, Lopes NN. Pilot study on the efficacy of combined intraoral and extraoral low-level laser therapy for prevention of oral mucositis in pediatric patients undergoing hematopoietic stem cell transplantation. *Photomed Laser Surg* 2015;33:540-6.
10. Eduardo Fde P, Bezinelli LM, de Carvalho DL, Lopes RM, Fernandes JF, Brumatti M, et al. Oral mucositis in pediatric patients undergoing hematopoietic stem cell transplantation: clinical outcomes in a context of specialized oral care using low-level laser therapy. *Pediatr Transplant* 2015;19:316-25.
11. Silva LC, Sacono NT, Freire Mdo C, Costa LR, Batista AC, Silva GB. The Impact of Low-Level Laser Therapy on Oral Mucositis and Quality of Life in Patients Undergoing Hematopoietic Stem Cell Transplantation Using the Oral Health Impact Profile and the Functional Assessment of Cancer Therapy-Bone Marrow Transplantation Questionnaires. *Photomed Laser Surg* 2015;33:357-63.
12. Bezinelli LM, Eduardo FP, Neves VD, Correa L, Lopes RM, Michel-Crosato E, et al. Quality of life related to oral mucositis of patients undergoing haematopoietic stem cell transplantation and receiving



- specialised oral care with low-level laser therapy: a prospective observational study. *Eur J Cancer Care (Engl)* 2016;25:668-74.
13. de Castro JF, Abreu EG, Correia AV, da Mota Vasconcelos Brasil C, da Cruz Perez DE, de Paula Ramos Pedrosa F. Low-level laser in prevention and treatment of oral mucositis in pediatric patients with acute lymphoblastic leukemia. *Photomed Laser Surg* 2013;31:613-8.
 14. Arbabi-Kalati F, Arbabi-Kalati F, Moridi T. Evaluation of the effect of low level laser on prevention of chemotherapy-induced mucositis. *Acta Med Iran* 2013;51:157-62.
 15. Cauwels RG, Martens LC. Low level laser therapy in oral mucositis: a pilot study. *Eur Arch Paediatr Dent* 2011;12:118-23.
 16. Gonzalez-Arriagada WA, Ramos LMA, Andrade MAC, Lopes MA. Efficacy of low-level laser therapy as an auxiliary tool for management of acute side effects of head and neck radiotherapy. *J Cosmet Laser Ther* 2017.
 17. Antunes HS, Herchenhorn D, Small IA, Araújo CMM, Viégas CMP, de Assis Ramos G, et al. Long-term survival of a randomized phase III trial of head and neck cancer patients receiving concurrent chemoradiation therapy with or without low-level laser therapy (LLLT) to prevent oral mucositis. *Oral Oncology* 2017;71:11-15.
 18. Gautam AP, Fernandes DJ, Vidyasagar MS, Maiya AG, Guddattu V. Low level laser therapy against radiation induced oral mucositis in elderly head and neck cancer patients-a randomized placebo controlled trial. *J Photochem Photobiol B* 2015;144:51-6.
 19. Oton-Leite AF, Silva GB, Morais MO, Silva TA, Leles CR, Valadares MC, et al. Effect of low-level laser therapy on chemoradiotherapy-induced oral mucositis and salivary inflammatory mediators in head and neck cancer patients. *Lasers Surg Med* 2015;47:296-305.
 20. Arora H, Pai KM, Maiya A, Vidyasagar MS, Rajeev A. Efficacy of He-Ne Laser in the prevention and treatment of radiotherapy-induced oral mucositis in oral cancer patients. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2008;105:180-6, 186.e1.