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Radiation-Induced Xerostomia

Xérostomie post-radique : évaluation de l'acupuncture

Articles connexes: - évaluation dans la xérostomie en général - évaluation de la pharmacopée chinoise -

1. Systematic Reviews and Meta-Analysis

1.1. Cheng 2026

Cheng X, Wang L, Ho MH, Lee SF, Ho FK, Yeung WF, Lin CC, Cheung DST. Non-Pharmacological Interventions for Improving Xerostomia Among Patients With Head and Neck Cancer: A Systematic Review and Network Meta-Analysis. Head Neck. 2026;48(1):302-316. https://doi.org/10.1002/hed.70100

Background	Xerostomia is highly prevalent among patients with head and neck cancer (HNC). This review aimed to compare the effectiveness of non-pharmacological interventions (NPIs) for xerostomia among patients with HNC.
Methods	We systematically searched nine databases (inception-October 2024) for RCTs assessing the effects of NPIs on xerostomia (self-reported xerostomia, incidence, stimulated/unstimulated salivary flow).
Results	Forty-six trials (3802 patients) identified 10 arms: multimodal NPIs, herbal medicine, **acupuncture**, exercise, oral care, devices, health education, supplements, and active/passive controls. At post-intervention, multimodal NPIs (the majority being herbal medicine combined with other therapies) ranked first for self-reported xerostomia, incidence, and unstimulated flow versus other interventions. Herbal medicine ranked second for self-reported and incidence of xerostomia and first for stimulated flow. Though lower-ranked, acupuncture significantly improved all outcomes versus passive controls. Sensitivity analyses showed enhanced acupuncture efficacy with high-dose radiotherapy.
Conclusion	Multimodal NPIs, herbal medicine, and **acupuncture** are promising for improving xerostomia among patients with HNC.

1.2. Shrateh 2026

Shrateh ON, Habib A, Shamsi HUR, Kumar KA, Omar BMM, Mansour A, Mohsen M, Hamad AM, Mair M, Sahota B. Treatment options for radiation-induced xerostomia in patients with head and neck cancer: a systematic review and meta-analysis. Br J Oral Maxillofac Surg. 2026;64(1):24-32. https://doi.org/10.1016/j.bjoms.2025.10.003

Background	Radiation-induced xerostomia is a frequent and debilitating complication in patients undergoing radiotherapy for head and neck cancer.

Objective	This study aimed to compare the effectiveness of available treatment modalities in preventing or managing radiation-induced xerostomia and associated complications in head and neck cancer patients.
Methods	A detailed search of PubMed and Google Scholar was conducted. Only randomised controlled trials (RCTs) involving radiotherapy-treated head and neck cancer patients were included. The interventions that were analysed encompassed pharmacological agents (for example, pilocarpine, and amifostine), antioxidants, herbal formulations, **acupuncture**, low-level laser therapy (LLLT), and regenerative approaches. Primary outcomes included severity of xerostomia, rates of salivary flow, mucositis, oral pain, dysphagia, and fatigue.
Results	Thirty-one randomised clinical trials met the inclusion criteria. Pooled analysis showed no significant reduction in severity of xerostomia at weeks 3, 4, or 6, or 6 months. Stimulated salivary flow did not significantly improve (mean difference (MD): 0.22; $p = 0.15$), while unstimulated salivary flow showed a significant benefit (MD: 0.13; 95% CI: 0.09 to 0.17; $p < 0.00001$). A significant reduction in the severity of oral pain was also noted (MD: -2.25; $p < 0.0001$). No significant differences were found for the incidence or duration of mucositis, dysphagia, or fatigue. Considerable heterogeneity was observed across the studies and no single intervention demonstrated consistent efficacy in managing radiation-induced xerostomia.
Conclusion	Some therapies have shown promise in improving unstimulated salivary flow and reducing oral pain; however, the overall evidence remains inconclusive. To address this persistent clinical challenge, future trials should adopt standardised outcome measures, assess combination therapies, and investigate novel regenerative strategies.

1.3. Gu 2025

Gu W, Dong H, Yuan Y, Yuan Z, Jiang X, Qian Y, Shen Z. Is Acupuncture an Effective Treatment for Radiation-Induced Xerostomia of Patients with Head and Neck Cancer? A Systematic Review and Meta-Analysis. J Integr Complement Med. 2025 May;31(5):431-444.
https://doi.org/10.1089/jicm.2023.0781

Backgound	Radiation-induced xerostomia (RIX) stands out as one of the most severe side effects among patients with head and neck cancer (HNC). Given the varied conclusions in previous studies concerning the association between acupuncture, sham acupuncture, or acupuncture combined with standard oral care and therapeutic effects, our aim is to conduct a systematic review to assess the effectiveness and safety of acupuncture in managing RIX in patients with HNC.
Methods	Six databases (Cochrane Library, PubMed, EMBASE, China National Knowledge Infrastructure, Chongqing VIP, and WanFang Database) were electronically searched, following the Cochrane manual and adhering to reported Preferred Reporting Item for Systematic Reviews and Meta-Analyses guidelines, from their inception dates to July 1, 2024. Primary randomized clinical trials included in systematic reviews or meta-analyses were identified, with the Xerostomia Questionnaire and Xerostomia Inventory designated as the primary outcomes. Salivary flow rates (unstimulated or stimulated) were defined as secondary outcomes.

Results	**Eight clinical trials involving 1273 participants** were analyzed, with six studies included in the meta-analysis. The results indicate that acupuncture demonstrated a significant improvement in patient-reported xerostomia scores (standardized mean difference [SMD] = -0.20, 95% confidence interval [95% CI] [-0.38, -0.02], I2 = 0%) in comparison to standard care, but did not significantly improve oral dryness symptoms compared with sham acupuncture (SMD = -0.06, 95% CI [-0.29, 0.16], I2 = 25.8%). The merged total showed negative result (SMD = -0.13, 95% CI [-0.27, 0.01], I2 = 8.2%). Additionally, there was no significant difference in stimulated salivary flow rate (SMD = -0.22, 95% CI [-0.58, 0.13], I2 = 0%) and unstimulated salivary flow rate (SMD = -0.19, 95% CI [-0.11, 0.72], I2 = 67.2%). In general, the acupuncture did not cause serious adverse effects.
Conclusion	As far as current research is concerned, acupuncture treatment for RIX symptoms in patients with HNC still lacks strong and convincing evidence support. The more scientific research methods and more clinical trials are still needed.

1.4. Mercadante 2025

Mercadante V, Smith DK, Abdalla-Aslan R, Andabak-Rogulj A, Brennan MT, Jaguar GC, Clark H, Fregnani E, Gueiros LA, Hovan A, Kurup S, Laheij AMGA, Lynggaard CD, Napeñas JJ, Peterson DE, Elad S, Van Leeuwen S, Vissink A, Wu J, Saunders DP, Jensen SB. A systematic review of salivary gland hypofunction and/or xerostomia induced by non-surgical cancer therapies: prevention strategies. Support Care Cancer. 2025 Jan 10;33(2):87. https://doi.org/10.1007/s00520-024-09113-x

Purpose	This systematic review aimed to assess the updated literature for the prevention of salivary gland hypofunction and xerostomia induced by non-surgical cancer therapies.
Methods	Electronic databases of MEDLINE/PubMed, EMBASE, and Cochrane Library were searched for randomized controlled trials (RCT) that investigated interventions to prevent salivary gland hypofunction and/or xerostomia. Literature search began from the 2010 systematic review publications from the Multinational Association of Supportive Care in Cancer/International Society of Oral Oncology (MASCC/ISOO) up to February 2024. Two independent reviewers extracted information regarding study design, study population, cancer treatment modality, interventions, outcome measures, methods, results, risk of bias (RoB version 2), and conclusions for each article.
Results	A total of 51 publications addressing preventive interventions were included. Eight RCTs on tissue-sparing radiation modalities were included showing significant lower prevalence of xerostomia, with unclear effect on salivary gland hypofunction. Three RCTs on preventive **acupuncture** showed reduced prevalence of xerostomia but not of salivary gland hypofunction. Two RCTs on muscarinic agonist stimulation with bethanechol suggested a preventive effect on saliva flow rate and xerostomia in patients undergoing head and neck radiation or radioactive iodine therapy. Two studies on submandibular gland transfer showed higher salivary flow rates compared to pilocarpine and lower prevalence of xerostomia compared to no active intervention. There is insufficient evidence on the effectiveness of vitamin E, amifostine, photobiomodulation, and miscellaneous preventive interventions.

Conclusion	This systematic review continues to support the potential of tissue-sparing tecniques and intensity-modulated radiation therapy (IMRT) to preserve salivary gland function in patients with head and neck cancer, with limited evidence on other preventive strategies, including **acupuncture** and bethanecol. Preventive focus should be on optimized and new approaches developed to further reduce radiation dose to the parotid, the submandibular, and minor salivary glands. As these glands are major contributors to moistening of the oral cavity, limiting the radiation dose to the salivary glands through various modalities has demonstrated reduction in prevalence and severity of salivary gland hypofunction and xerostomia. There remains no evidence on preventive approaches for checkpoint inhibitors and other biologicals due to the lack of RCTs.

1.5. Tsai 2025

Tsai RY, Lin SY, Chen CC, Hsiao Y. Efficacy of Acupuncture in Managing Radiation-Induced Xerostomia: An Updated Meta-Analysis. Int J Med Sci. 2025 May 31;22(11):2802-2815. https://doi.org/10.7150/ijms.110366

Backgound	Xerostomia, or dry mouth, frequently affects head and neck cancer patients receiving radiotherapy, leading to discomfort and impacting daily functions such as speaking and swallowing. Conventional treatments may offer limited relief and are often accompanied by undesirable side effects. Acupuncture, as a non-pharmacological intervention, is increasingly explored for its potential to mitigate xerostomia symptoms.
Objective	This systematic review and meta-analysis aim to assess the effectiveness of acupuncture in improving symptoms and quality of life in patients experiencing radiation-induced xerostomia.
Methods	A thorough literature search was conducted across several databases, including MEDLINE, Embase, Cochrane Central, and Web of Science, up to the current year. We included randomized controlled trials (RCTs) that evaluated acupuncture's impact on salivary flow and symptom relief in adults with radiation-induced xerostomia. Primary outcomes were changes in salivary flow, with secondary outcomes including patient-reported symptom severity and quality of life metrics. The risk of bias was evaluated, and data were synthesized using a random-effects model.
Results	A total of **11 RCTs involving 1271 participants** were included in the analysis. The pooled data showed a moderate increase in salivary flow in the acupuncture group, effective in both resting and stimulated conditions. Additionally, acupuncture demonstrated significant benefits in reducing xerostomia symptoms and improving quality of life scores compared to control interventions. Subgroup analysis revealed that traditional acupuncture was more effective than Transcutaneous Electrical Nerve Stimulation (TENS).
Conclusions	The findings suggest that acupuncture may be an effective complementary treatment for radiation-induced xerostomia, offering relief from dry mouth symptoms and potentially improving quality of life. Further research should focus on standardizing acupuncture protocols to confirm these benefits across diverse patient populations.

1.6. Khamdi 2024

Khamdi S, Matangkasombut O, Lam-Ubol A. Non-pharmacologic interventions for management of radiation-induced dry mouth: A systematic review. Oral Dis. 2024 Jul;30(5):2876-2893. https://doi.org/10.1111/odi.14804

Objectives	Radiation-induced dry mouth negatively impacts patients' oral health and quality of life. Currently, evidence-based recommendation for non-pharmacologic interventions is still lacking. This study aimed to systematically review clinical trials evaluating the efficacy of non-pharmacologic interventions in cancer patients with radiation-induced dry mouth.
Methods	Randomized controlled trials from 2000 were searched from 4 databases, including MEDLINE, Cochrane, Embase via OVID, and SCOPUS, up to December 16th, 2022 (PROSPERO registration CRD42022378405). The risk of bias was assessed using the revised Cochrane risk of bias assessment tool.
Results	Twenty-one studies were included: 11 on artificial saliva, 4 on electrical nerve stimulation (TENS), **2 on acupuncture**, and one study each on low-level laser therapy, stem cells, chewing gum, and probiotics. Overall bias was low, medium, and high in 33%, 48%, and 19% of the studies, respectively. Certain artificial saliva products and TENS were shown to improve dry mouth symptoms and salivary flow rate (SFR). One study showed that stem cell transplantation significantly increased SFR.
Conclusions	The evidence suggested that certain artificial saliva products and TENS are promising management. However, the evidence was still limited due to heterogeneity of interventions and outcome measurements. Thus, future studies using standard measurements and long-term follow-up are warranted.

1.7. Bonomo 2022

Bonomo P, Stocchi G, Caini S, Desideri I, Santarlasci V, Becherini C, Limatola V, Locatello LG, Mannelli G, Spinelli G, Guido C, Livi L. Acupuncture for radiation-induced toxicity in head and neck squamous cell carcinoma: a systematic review based on PICO criteria. Eur Arch Otorhinolaryngol. 2022 Apr;279(4):2083-2097. https://doi.org/10.1007/s00405-021-07002-1

Purpose	In head and neck squamous cell carcinoma (HNSCC), the potential mitigating effect of complementary medicine interventions such as acupuncture for radiation-induced toxicity is unknown. This study aimed to assess the impact of acupuncture on the incidence and degree of severity of common radiation-induced side effects.
Methods	In accordance with pre-specified PICO criteria, a systematic review was performed. Two electronic databases (Medline and Embase) were searched over a 10-year time frame (01/01/10 to 30/09/20). Patients undergoing a curatively intended, radiation-based treatment for histologically confirmed squamous cell carcinoma of the nasopharynx, oropharynx, larynx, hypopharynx and oral cavity represented the target population of our study. Accurate information on the acupuncture methodology was reported. All included articles were evaluated to identify any potential source of bias RESULTS: Five papers were included in our qualitative analysis, for a total of 633 subjects. Compliance to per-protocol defined schedule of acupuncture sessions was high, ranging from 82 to 95.9%. Most patients (70.6%) were randomly allocated to receive acupuncture for its potential preventive effect on xerostomia. The large heterogeneity in study settings and clinical outcomes prevented from performing a cumulative quantitative analysis, thus no definitive recommendations can be provided.
Conclusions	Although shown to be feasible and safe, no firm evidence currently supports the use of acupuncture for the routine management of radiation-induced toxicity in HNSCC.

1.8. NI 2020 ☆

Ni X, Tian T, Chen D, Liu L, Li X, Li F, Liang F, Zhao L. Acupuncture for Radiation-Induced Xerostomia in Cancer Patients: A Systematic Review and Meta-Analysis. Integr Cancer Ther. 2020 Jan-Dec;19:1534735420980825. doi]

Background	Radiation-induced xerostomia is one of the most common symptoms experienced by cancer patients. The aim of our study is to evaluate the preventive and therapeutic effect of acupuncture for radiation-induced xerostomia in cancer patients.
Methods	Eight databases were searched for all published randomized clinical trials (RCTs) on acupuncture for radiation-induced xerostomia in cancer patients up to December 31, 2019. Manual searching included other conference abstracts and reference lists. Meta-analysis was conducted using Revman V.5.3, and risks of bias for included studies was assessed following the Cochrane Handbook.
Results	Eight clinical trials (725 participants) were analyzed, and 3 were included in a meta-analysis. All included trials had a high risk of bias, such as selection, performance, and detection bias. Analysis indicated favorable effects of acupuncture regarding the improvement of xerostomia symptoms (MD -3.05, P = 0.02, 95% CI -5.58 to -0.52), compared with sham acupuncture. There were no significant differences between real acupuncture and sham acupuncture regarding the stimulated salivary flow rate (MD 0.37, P = 0.08, 95% CI -0.05 to 0.79) and unstimulated salivary flow rate (MD 0.09, P = 0.12, 95% CI -0.02 to 0.21), which were whole salivary flow rate. Compared with no acupuncture (standard oral care, usual care, or no treatment), acupuncture produced a significant improvement in patient-reported xerostomia, without causing serious adverse effects. However, a Grading of Recommended Assessments analysis revealed that the quality of all acupuncture outcome measures was low.
Conclusions	The present meta-analysis and systematic review suggests that **acupuncture is effective at improving xerostomia symptoms in cancer patients but not at objective salivary flow measurements**. The evidence is still limited due to the low quality of the published studies.

1.9. Mercadante 2017 Ø

Mercadante V, Al Hamad A, Lodi G, Porter S , Fedele S. Interventions for the management of radiotherapy-induced xerostomia and hyposalivation: A systematic review and meta-analysis. Oral Oncol. 2017;66:64-74. [10221].

Introduction	Salivary gland hypofunction is a common and permanent adverse effect of radiotherapy to the head and neck. Randomised trials of available treatment modalities have produced unclear results and offer little reliable guidance for clinicians to inform evidence-based therapy. We have undertaken this systematic review and meta-analysis to estimate the effectiveness of available interventions for radiotherapy-induced xerostomia and hyposalivation.
Methods	We searched MEDLINE, Cochrane Central, EMBASE, AMED, and CINAHL database through July 2016 for randomised controlled trials comparing any topical or systemic intervention to active and/or non-active controls for the treatment of radiotherapy-induced xerostomia. The results of clinically and statistically homogenous studies were pooled and meta-analyzed.
Results	1732 patients from twenty studies were included in the systematic review. Interventions included systemic or topical pilocarpine, systemic cevimeline, saliva substitutes/mouthcare systems, hyperthermic humidification, **acupuncture, acupuncture-like transcutaneous electrical nerve stimulation,** low-level laser therapy and herbal medicine. Results from the meta-analysis, which included six studies, suggest that both cevimeline and pilocarpine can reduce xerostomia symptoms and increase salivary flow compared to placebo, although some aspects of the relevant effect size, duration of the benefit, and clinical meaningfulness remain unclear. With regard to interventions not included in the meta-analysis, we found no evidence, or very weak evidence, that they can reduce xerostomia symptoms or increase salivary flow in this population.

Conclusions	Pilocarpine and cevimeline should represent the first line of therapy in head and neck cancer survivors with radiotherapy-induced xerostomia and hyposalivation. **The use of other treatment modalities cannot be supported on the basis of current evidence.**

1.10. Garcia 2015 ☆

Garcia M , Niemtzow RC, McQuade J, Haddad R, Lee R, Spano M, Cohen L. Acupuncture for xerostomia in patients with cancer: An update. Medical Acupuncture. 2015; 27(3):158-67. [188884]

Background	Xerostomia (dry mouth) is a common side-effect of cancer treatment following radiotherapy, especially in patients with head-and-neck (HN) cancer.
Objective	The purpose of this review was to evaluate evidence related to acupuncture for xerostomia in patients with HN cancer.
Materials and Methods	Embase, Medline,_ Cochrane (all databases), PubMed, and Scopus were searched from inception through December 2014 for studies published in English that were randomized controlled trials (RCTs) evaluating acupuncture to treat and/or prevent xerostomia in patients with cancer. A usual-care and/or placebo comparison group was required for inclusion. Risk of bias (ROB) was rated as low, high, or unclear according to Cochrane criteria. Outcomes and treatment parameters were summarized.
Results	Of 184 articles identified, 136 duplicates were omitted, leaving 48 publications that were screened. Thirty-nine studies were excluded because they were not prospective RCTs of acupuncture in patients with cancer, and three studies did not involve needle insertion into acupuncture points. **Six studies met all inclusion criteria**. Four investigated acupuncture to treat xerostomia, and two investigated acupuncture to prevent xerostomia. Of the six included trials, four reported significant between-group differences in favor of real acupuncture, and two reported significant within-group differences only. No studies were rated as low ROB, either because of low statistical power or a lack of blinding.
Conclusions	**Acupuncture may be a helpful adjunct to cancer care for treatment and/or prevention of xerostomia in patients with HN cancer,** but studies to date have been limited by small sample size and/or lack of blinding. Large phase III trials are currently underway.

1.11. Lovelace 2014 Ø

Lovelace TL, Fox NF, Sood AJ, Nguyen SA, Day Ta. Management of radiotherapy-induced salivary hypofunction and consequent xerostomia in patients with oral or head and neck cancer: meta-analysis and literature review. Oral Surg Oral Med Oral Pathol Oral Radiol. 2014. 117(5):595-607. [178881].

Objective	To analyze the efficacy of various treatment options for radiation-induced hyposalivation in patients with head and neck cancer.
Methods	Study design: A literature review and meta-analysis was performed on all appropriate literature identified via MEDLINE/PubMed.
Results	Fourteen articles were identified that met inclusion criteria for review, and 8 articles qualified for inclusion in the meta-analysis. The available literature addressed both objective and subjective responses of hyposalivation, xerostomia, or both to cholinergic agonists (such as pilocarpine and cevimeline), salivary substitutes, hyperbaric oxygen, and acupuncture.

Conclusions	This analysis indicated that cholinergic agonists were more effective in treating radiation-induced hyposalivation compared with salivary substitutes, hyperbaric oxygen, and acupuncture. However, other treatment modalities, such as salivary substitutes and hyperbaric oxygen, were also found to subjectively improve patients' perception of xerostomia.

1.12. Zhuang 2012 Ø

Zhuang L, Yang Z, Zeng X, Zhua X, Chen Z, Liu L, Meng Z. The preventive and therapeutic effect of acupuncture for radiation-induced xerostomia in patients with head and neck cancer: a systematic review. Integr Cancer Ther. 2012. [159293].

Background	Methods: Some studies suggest that acupuncture may be beneficial.
Objectives	The authors evaluated the preventive and therapeutic effect of acupuncture for radiation-induced xerostomia among patients with head and neck cancer.
Methods	PUBMED, EMBASE, Cochrane Library, CBM, CAJD, Wan Fang database, and VIP Database for Chinese Technical Periodicals were electronically searched, in conjunction with further manual search for relevant articles. Studies that met the inclusion criteria were systematically evaluated.
Results	Three randomized controlled trials (RCTs) investigating the therapeutic effect of acupuncture were included. One RCT on the preventive effect of acupuncture was found. Because of the considerable variation among included studies, meta-analysis was not possible. Two included RCTs used placebo controls, and both observed significant improvement in the salivary flow rates between acupuncture and control groups. However, no significant differences were found. Three included RCTs suggested that acupuncture for radiation-induced xerostomia can improve patients' subjective symptoms. The only study evaluating the preventive effect of acupuncture for radiation-induced xerostomia showed positive changes in salivary flow rates (both unstimulated and stimulated) and dry mouth -related symptoms. Acupuncture treatment was well tolerated by all patients and no severe adverse effects were seen.
Conclusions	Insufficient evidence is available to judge whether acupuncture is safe and whether it is effective in preventing or treating radiation-induced xerostomia. Significant research remains to be done before acupuncture can be recommended for routine use in radiation-induced xerostomia.

1.13. Jensen 2010 ☆

Jensen SB et al. A systematic review of salivary gland hypofunction and xerostomia induced by cancer therapies: Management strategies and economic impact. Support Care Cancer. 2010; 18(8):1061-79. [155308].155308

Objectifs	This systematic review aimed to assess the literature for management strategies and economic impact of salivary gland hypofunction and xerostomia induced by cancer therapies and to determine the quality of evidence-based management recommendations.
Méthode	The electronic databases of MEDLINE/PubMed and EMBASE were searched for articles published in English since the 1989 NIH Development Consensus Conference on the Oral Complications of Cancer Therapies until 2008 inclusive. For each article, two independent reviewers extracted information regarding study design, study population, interventions, outcome measures, results, and conclusions.

Résultats	Seventy-two interventional studies met the inclusion criteria. In addition, 49 intensity-modulated radiation therapy (IMRT) studies were included as a management strategy aiming for less salivary gland damage. Management guideline recommendations were drawn up for IMRT, amifostine, muscarinic agonist stimulation, oral mucosal lubricants, acupuncture, and submandibular gland transfer.
Conclusions	There is evidence that salivary gland hypofunction and xerostomia induced by cancer therapies can be prevented or symptoms be minimized to some degree, depending on the type of cancer treatment. Management guideline recommendations are provided for IMRT, amifostine, muscarinic agonist stimulation, oral mucosal lubricants, acupuncture, and submandibular gland transfer. Fields of sparse literature identified included effects of gustatory and masticatory stimulation, specific oral mucosal lubricant formulas, submandibular gland transfer, acupuncture, hyperbaric oxygen treatment, management strategies in pediatric cancer populations, and the economic consequences of salivary gland hypofunction and xerostomia.

1.14. O'Sullivan 2010 Ø

O'sullivan EM, Higginson IJ. Clinical effectiveness and safety of acupuncture in the treatment of irradiation-induced xerostomia in patients with head and neck cancer: a systematic review. Acupuncture in Medicine. 2010. 28(4):191-9. [158385].

Background	Irradiation-induced xerostomia seriously reduces quality of life for patients with head and neck cancer (HNC). Anecdotal evidence suggests that acupuncture may be beneficial.
Objective	To systematically review evidence on clinical effectiveness and safety of acupuncture in irradiation-induced xerostomia in patients with HNC.
Methods	A detailed search was performed to identify randomised controlled trials (RCTs) and systematic reviews of RCTs on acupuncture in irradiation-induced xerostomia, using AMED, BNIA, CINAHL, Cochrane, Embase, HPSI, PsycInfo and Medline. Grey literature was explored and 11 journals hand searched. Search terms included: acupuncture, xerostomia, salivary hypofunction, hyposalivation, dry mouth, radiotherapy, irradiation, brachytherapy, external beam. Two authors independently extracted data for analysis using predefined selection criteria and quality indicators.
Results	43 of the 61 articles identified were excluded on title/abstract. 18 articles underwent full-text review; three were deemed eligible for inclusion. Two trials had moderate risk of bias; one had high risk. Two trials compared acupuncture with sham acupuncture; one control arm received 'usual care'. Outcome measurements included salivary flow rates (SFRs) in two trials and subjective questionnaires in three. All three trials reported significant reduction in xerostomia versus baseline SFR ($p<0.05$); one reported greater effect in the intervention group for stimulated SFR ($p<0.01$). Subjective assessment reported significant differences between real acupuncture and control in two trials ($p<0.02$-0.05). Insufficient evidence was presented to undertake risk/benefit assessment.
Conclusions	Limited evidence suggests that acupuncture is beneficial for irradiation-induced xerostomia. Although current evidence is insufficient to recommend this intervention, it is sufficient to justify further studies. Highlighted methodological limitations must be dealt with.

2. Overview of systematic reviews

2.1. Hubner 2022 Ø

Hubner J, Dorfler J, Freuding M, Zaiser C, Buntzel J, Keinki C, Käsmann L. Methodological Review: Summary of Findings for Acupuncture as Treatment for Cancer Therapy-induced Xerostomia. In Vivo. 2022 Nov-Dec;36(6):2579-2597. https://doi.org/10.21873/invivo.12993

Background/aim	With a rapidly growing number of studies, systematic reviews (SRs) and meta-analyses (MAs) on acupuncture, the level of evidence seems to be high. Yet, traditional Chinese acupuncture is built on concepts which are not in accordance with science-based medicine. Accordingly, our aim was to critically assess the evidence presented in SRs and MAs on xerostomia induced by treatment of head and neck cancer with radiotherapy.
Materials and Methods	In February 2022, a systematic search of five electronic databases (Embase, Cochrane, PsychInfo, CINAHL and Medline) was conducted to find SRs/MAs on acupuncture use against cancer-treatment induced xerostomia. We evaluated all SRs/MAs using the AMSTAR instrument, comparing the assessment of the individual studies included and the conclusions drawn by the authors. In case of heterogeneity between the SRs, we evaluated the controversial items of the assessments directly from the studies.
Results	Finally, **eight SRs/Mas** were included. Most of them show methodological drawbacks in several domains of the AMSTAR instrument, which influences the credibility of the results.
Conclusion	The evidence on the use of acupuncture as treatment for radiotherapy-induced xerostomia is low. Present SRs/MAs mainly summarize results of a few and mostly small studies. Even though the included studies greatly overlap, the quality of the presentation and interpretation of the authors differs greatly. Therefore, a high quality and conclusive summary of the present evidence on the use of acupuncture to treat radiotherapy induced xerostomia is still missing.

3. Clinical Practice Guidelines

⊕ positive recommendation (regardless of the level of evidence reported)
Ø negative recommendation (or lack of evidence)

3.1. Royal College of Surgeons of England (RCS, England) 2025 ⊕

Faculty of Dental Surgery, Royal College of Surgeons of England. The oral and dental management of patients before, during and after cancer therapy. London: RCS England; 2025. https://www.rcseng.ac.uk/-/media/FDS/Navdeep/The-Oral-and-Dental-Management-of-Patients-Before-During-and-After-Cancer-Therapy--Final-Guidelines.pdf

Xerostomia: For patients with head and neck cancer, oral pilocarpine and oral cevimeline, **acupuncture**, or transcutaneous electrostimulation may be offered after radiation therapy.

3.2. Multinational Association of Supportive Care in Cancer (MASCC) and the International Society of Oral Oncology (ISOO) 2024 Ø

Hong C, Jensen SB, Vissink A, Bonomo P, Santos-Silva AR, Gueiros LA, Epstein JB, Elad S. MASCC/ISOO Clinical Practice Statement: Management of salivary gland hypofunction and xerostomia in cancer patients. Support Care Cancer. 2024 Jul 25;32(8):548. https://doi.org/10.1007/s00520-024-08688-9

There are a few randomized controlled trials evaluating the use of **acupuncture**, photobiomodulation , salivary gland ductal irrigation/dilation in alleviating salivary gland hypofunction and/or xerostomia. However, the recommendation for their routine use in the clinical setting is premature mainly because of conflicting evidence and the heterogeneities in treatment protocols.

3.3. Association of the Scientific Medical Societies, German Cancer Society, German Cancer Aid, (AWMF, DKG, DK, Germany) 2021 ⊕

S3-Leitlinie Komplementärmedizin in der Behandlung von onkologischen PatientInnen. September 2021. https://www.leitlinienprogramm-onkologie.de/leitlinien/komplementaermedizin/

11.3.1.14. Xerostomia. Acupuncture. Recommendation strength: Can. Patient context: Patients with head and neck tumors. Note: During radio/chemotherapy. **Acupuncture**. Recommendation strength: Can. Patient context: Oncological patients .Note: Xerostomia after adjuvant radiotherapy.

3.4. Multinational Association of Supportive Care in Cancer/International Society of Oral Oncology (MASCC/ISOO) / American Society of Clinical Oncology (ASCO, USA) 2021 ⊕

Mercadante V, Jensen SB, Smith DK, Bohlke K, Bauman J, Brennan MT, Coppes RP, Jessen N, Malhotra NK, Murphy B, Rosenthal DI, Vissink A, Wu J, Saunders DP, Peterson DE. Salivary Gland Hypofunction and/or Xerostomia Induced by Nonsurgical Cancer Therapies: ISOO/MASCC/ASCO Guideline. J Clin Oncol. 2021:JCO2101208. [219405].doi

Recommendation 1.3. Acupuncture may be offered during radiation therapy for head and neck cancer to reduce the risk of developing xerostomia (type: evidence-based; evidence quality: intermediate; strength of recommendation: moderate).
Recommendation 2.4. Acupuncture may be offered after radiation therapy in patients with head and neck cancer for improvement of xerostomia (type: evidence-based; evidence quality: low; strength of recommendation: weak).
Recommendation 2.5. Transcutaneous electrostimulation or acupuncture-like transcutaneous electrostimulation of the salivary glands may be offered after radiation therapy in patients with head and neck cancer for improvement of salivary gland hypofunction and xerostomia (type: evidence-based; evidence quality: low; strength of recommendation: weak).

3.5. Ontario Health - Cancer Care Ontario (CCO, Canada) 2021 ⊕

Ontario Health (Cancer Care Ontario). Symptom management algorithm: xerostomia and salivary hypofunction in adults with cancer. Toronto: Ontario Health; 2021. https://www.cancercareontario.ca/en/system/files_force/symptoms/XerostomiaAndSalivaryHypofunctionAlgorithm.pdf?download=1

Acupuncture may be offered during radiation therapy for head and neck cancer to *reduce the risk* of developing xerostomia.
Acupuncture may be offered after radiation therapy in patients with head and neck cancer *for improvement* of xerostomia

3.6. Association of the Scientific Medical Societies, German Cancer Society,

German Cancer Aid, (AWMF, DKG, DK, Germany) 2020 ⊕

Supportive Therapie bei onkologischen PatientInnen. Leitlinienprogramm Onkologie. Deutsche Krebsgesellschaft, Deutsche Krebshilfe, AWMF. 2020. [219443]. https://www.leitlinienprogramm-onkologie.de/fileadmin/user_upload/Downloads/Leitlinien/Supportivtherapie/LL_Supportiv_Langversion_1.3.pdf

Xerostomia. The prophylactic use of classical **acupuncture** therapy improves subjective and objective parameters of radiogenic xerostomia. It can be used. **Acupuncture** can improve the subjective parameters of xerostomia and can be used.

3.7. British Columbia Cancer (BCC, Canada) 2019 ⊕

British Columbia Cancer. Symptom management guidelines: xerostomia. 2019. https://www.bccancer.bc.ca/nursing-site/documents/18.%20xerostomia.pdf

Acupuncture – Stimulation of salivary flow unclear, but may be helpful for some patients

3.8. National Cancer Center Saudia Arabia (NCC, Saudia Arabia) 2019 ⊕

National Cancer Center Saudia Arabia. Saudi palliative care national clinical guidelines for oncology.2019. https://shc.gov.sa/_layouts/15/download.aspx?SourceUrl=https://shc.gov.sa/ar/Centers/NCC/Activities/Documents/Palliative%20Care%20Guidelines%202019.pdf

Advise use of **Acupuncture** as it is a possible intervention for the treatment of radiation-induced xerostomia in patients with a residual functional capacity of the salivary glands and is a treatment modality without serious adverse effects.

3.9. The Royal College of Surgeons of England / The British Society for Disability and Oral Health (RCS, BSDH) 2018 ⊕

Royal College of Surgeons of England, British Society for Disability and Oral Health. The oral management of oncology patients requiring radiotherapy, chemotherapy and/or bone marrow transplantation: clinical guidelines. Updated 2018. London: RCS England; 2018. https://www.rcseng.ac.uk/-/media/files/rcs/fds/publications/rcs-oncology-guideline-update--v36.pdf

There is low quality evidence that acupuncture results in a small increase in saliva. Acupuncture has minimal side effects and clinical trials are recommended (Jensen et al., 2010) (Furness et al., 2013).

3.10. American Academy of Oral Medicine (AAOM, USA) 2016 ⊕

AAOM Clinical Practice Statement: Subject: Clinical management of cancer therapy-induced salivary gland hypofunction and xerostomia. Oral Surg Oral Med Oral Pathol Oral Radiol. 2016 Sep;122(3):310-2. https://doi.org/10.1016/j.oooo.2016.04.015

H. Acupuncture or mild electrostimulation of the salivary glands are novel treatments that may alleviate xerostomia in some patients (8)

Supporting Reference:

- 8. Furness S, Bryan G, McMillan R, Worthington HV. Interventions for the management of dry mouth: nonpharmacological interventions. Cochrane Database Syst Rev.2013;8:CD009603. https://doi.org/10.1002/14651858.CD009603.pub3

3.11. Association Francophone des Soins Oncologiques de Support (AFSOS, France) 2014 ⊕

Association Francophone des Soins Oncologiques de Support (AFSOS). Fiches Réferentiels : L'acupuncture en onco-hématologie MAJ 2014 (online)

Xérostomie post-radique. Acupuncture (Niveau de preuve HAS : B)

3.12. British Columbia Cancer (BCA, Canada) 2014 ⊕

Symptom Management Guidelines: xerostomia. BC Cancer Agency. 2014. [177971].

Acupuncture – Stimulation of salivary flow unclear, but may be helpful for some patients.

3.13. European Partnership for Action Against Cancer (EPAA, Europe) 2014 ⊕

Complementary and alternative medicine (CAM) in cancer care. Development and opportunities of Integrative Oncology. European Partnership for Action Against Cancer (EPAAC). 2014;:339P. [186081].

As to the use of acupuncture and TCM in the treatment of symptoms correlated to anti-cancer therapy, the literature has demonstrated a good level of evidence in the following cases: nausea and vomiting, pain, hotflashes and **xerostomia**, taking also in account the absence of relevant adverse effects and interactions.

3.14. Royal College of Surgeons of England / The British Society for Disability and Oral Health (RCSE, BSDOH, UK) 2012 ⊕

The Oral Management of Oncology Patients Requiring Radiotherapy, Chemotherapy and / or Bone Marrow Transplantation. Clinical Guidelines. The Royal College of Surgeons of England / The British Society for Disability and Oral Health. 2012:58p. [197604].

Acupuncture has minimal side effects and potential to increase salivary flow after radiotherapy where there is some residual function and is recommended. (IIB)

3.15. Société Française d'Oto-Rhino-Laryngologie et de Chirurgie de la Face et du Cou (SFORL, France) 2014 ⊕

Recommandations pour la pratique clinique : Prise en charge des douleurs somatiques induites par les traitements des cancers des VADS. SFORL 2014 [160900].

Recommandation 12: Le groupe de travail recommande d'envisager l'acupuncture par un praticien expérimenté dans la prise en charge des douleurs cervicales séquellaires d'un curage ganglionnaire et dans la **xérostomie après radiothérapie**. (Grade B).

3.16. American College of Chest Physicians (ACCP, USA) 2007 ⊕

Cassileth BR, Deng GE, Gomez JE, Johnstone PA, Kumar N, Vickers AJ; American College of Chest Physicians. Complementary therapies and integrative oncology in lung cancer: Accp Evidence-Based Clinical Practice Guidelines (2nd Edition). Chest. 2007;132(3sup:340s-54s. [146961]

Recommendation 7. Acupuncture is recommended as a complementary therapy when pain is poorly controlled or when side effects such as neuropathy or xerostomia from other modalities are clinically significant. Grade of recommendation, 1A

4. Randomized Controlled Trials

4.1. Sources

1. **Acudoc2**: base de données du Centre de Documentation du GERA (ECR non inclus dans les revues systématiques sources).
2. **Mercadante 2017**: Mercadante V, Al Hamad A, Lodi G, Porter S , Fedele S. Interventions for the management of radiotherapy-induced xerostomia and hyposalivation: A systematic review and meta-analysis. Oral Oncol. 2017;66:64-74. [10221].Garcia M , Niemtzow RC, McQuade J, Haddad R, Lee R, Spano M, Cohen L. Acupuncture for xerostomia in patients with cancer: An update. Medical Acupuncture. 2015; 27(3):158-67. [188884]
3. **Lovelace 2014**: Lovelace TL, Fox NF, Sood AJ, Nguyen SA, Day Ta. Management of radiotherapy-induced salivary hypofunction and consequent xerostomia in patients with oral or head and neck cancer: meta-analysis and literature review. Oral Surg Oral Med Oral Pathol Oral Radiol. 2014. 117(5):595-607. [178881].
4. **Zhuang 2012**: Zhuang L, Yang Z, Zeng X, Zhua X, Chen Z, Liu L, Meng Z. The preventive and therapeutic effect of acupuncture for radiation-induced xerostomia in patients with head and neck cancer: a systematic review. Integr Cancer Ther. 2012. [159293].
5. **Jensen 2010**: Jensen SB et al. A systematic review of salivary gland hypofunction and xerostomia induced by cancer therapies: Management strategies and economic impact. Support Care Cancer. 2010; 18(8):1061-79. [155308].
6. **O'sullivan 2010**: O'Sullivan EM, Higginson IJ. Clinical effectiveness and safety of acupuncture in the treatment of irradiation-induced xerostomia in patients with head and neck cancer: a systematic review. Acupuncture in Medicine. 2010. 28(4):191-9.

4.2. List

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2015	Wong RK, Deshmukh S, Wyatt G, Sagar S, Singh AK, Sultanem K, Nguyen-Tân PF, Yom SS, Cardinale J, Yao M, Hodson I, Matthiesen CL, Suh J, Thakrar H, Pugh SL, Berk L. Acupuncture-like transcutaneous electrical nerve stimulation versus pilocarpine in treating radiation-induced xerostomia: results of rtog 0537 phase 3 study. Int J Radiat Oncol Biol Phys. 2015;92:220-7. [179422].	Mercadante 2017

2012	Alimi D, Poulain P, Brulé S, Véricel R, Cornillot P, Le Toumelin P. Étude contrôlée randomisée évaluant l' action de l' auriculothérapie dans la xérostomie induite par la radiothérapie des tumeurs de la tête et du cou. Rev Odontostomatol. 2012;41:245-59. [202488].	Acudoc2
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