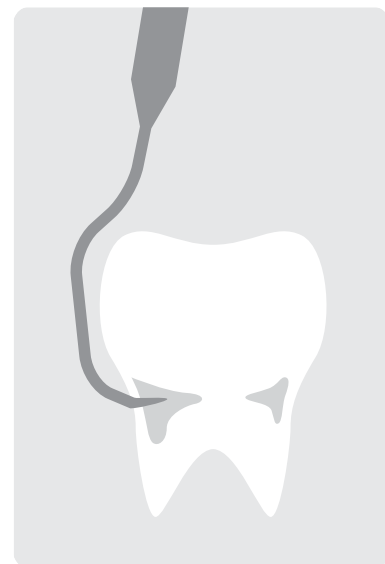


PEAK

Evidence-based clinical practice guideline on the nonsurgical treatment of chronic periodontitis by means of scaling and root planing with or without adjuncts

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Evidence-based clinical practice guideline on the nonsurgical treatment of chronic periodontitis by means of scaling and root planing with or without adjuncts

ABSTRACT

Background. A panel of experts convened by the American Dental Association Council on Scientific Affairs presents an evidence-based clinical practice guideline on nonsurgical treatment of patients with chronic periodontitis by means of scaling and root planing (SRP) with or without adjuncts.

Methods. The authors developed this clinical practice guideline according to the American Dental Association's evidence-based guideline development methodology. This guideline is founded on a systematic review of the evidence that included 72 research articles providing clinical attachment level data on trials of at least 6 months' duration and published in English through July 2014. The strength of each recommendation (*strong*, *in favor*, *weak*, *expert opinion for*, *expert opinion against*, and *against*) is based on an assessment of the level of certainty in the evidence for the treatment's benefit in combination with an assessment of the balance between the magnitude of the benefit and the potential for adverse effects.

Practical Implications and Conclusions. For patients with chronic periodontitis, SRP showed a moderate benefit, and the benefits were judged to outweigh potential adverse effects. The authors voted *in favor* of SRP as the initial nonsurgical treatment for chronic periodontitis. Although

systemic subantimicrobial-dose doxycycline and systemic antimicrobials showed similar magnitudes of benefits as adjunctive therapies to SRP, they were recommended at different strengths (*in favor* for systemic subantimicrobial-dose doxycycline and *weak* for systemic antimicrobials) because of the higher potential for adverse effects with higher doses of antimicrobials. The strengths of 2 other recommendations are *weak*: chlorhexidine chips and photodynamic therapy with a diode laser. Recommendations for the other local antimicrobials (doxycycline hyclate gel and minocycline microspheres) were *expert opinion for*. Recommendations for the nonsurgical use of other lasers as SRP adjuncts were limited to *expert opinion against* because there was uncertainty regarding their clinical benefits and benefit-to-adverse effects balance. Note that *expert opinion for* does not imply endorsement but instead signifies that evidence is lacking and the level of certainty in the evidence is low.

Key Words. Antibiotics; evidence-based dentistry; lasers; minocycline; periodontitis; practice guidelines; root planing; chlorhexidine.

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In 2011, the Council on Scientific Affairs (CSA) of the American Dental Association (ADA) resolved to develop a clinical practice guideline on nonsurgical treatments including scaling and root planing (SRP) with or without adjuncts for patients with any severity of chronic periodontitis on the basis of an evidence-based systematic review¹ of the literature. We evaluated the following professionally applied or prescribed medical adjuncts: locally applied antimicrobials (chlorhexidine chips, doxycycline hyclate gel, and minocycline microspheres), nonsurgical use of lasers (diode, both photodynamic therapy [PDT] and non-PDT;

Nd:YAG [neodymium:yttriumaluminum-garnet]; and erbium), systemic antimicrobials, and systemic subantimicrobial-dose doxycycline (SDD). We considered systemic antimicrobials and systemic SDD separately because the latter appears to inhibit mammalian collagenase activity (matrix metalloproteinase 8) and not function as an antibiotic.^{2,3} We did not consider experimental adjuncts, adjuncts not currently available in the United States, nonprescription (over-the-counter) adjuncts, or surgical treatments.



We addressed the following clinical questions, formatted in the Patient–Intervention–Comparator–Outcome style:

- Question 1: In patients with chronic periodontitis, does SRP (hand or ultrasonic), when compared with no treatment, supragingival scaling and polish (prophylaxis), or debridement, result in greater improvement of clinical attachment level (CAL)?
- Question 2: In patients with chronic periodontitis, does the use of locally delivered antibiotics or antimicrobials, systemic antibiotics, combinations of locally delivered and systemic antibiotics, agents for biomodification or host modulation, or nonsurgical lasers as adjuncts to SRP, compared with SRP alone, result in greater improvement of CAL?

This clinical practice guideline is intended to assist general practitioners with decision making about the use of SRP, as well as locally delivered and systemic adjuncts, for patients with periodontitis. This guideline does not address surgical periodontal treatments. Not all patients with chronic periodontitis respond adequately to nonsurgical treatment with or without adjuncts, and the practitioner should consider surgical or other more complex interventions or referral to a specialist when appropriate. The recommendations in this document do not purport to define a standard of care. Rather, as part of the evidencebased dentistry approach, these recommendations should be integrated with each practitioner's professional judgment and each patient's needs and preferences.

BACKGROUND

Chronic periodontitis is a prevalent condition, affecting 47.2% of the adult US population aged 30 years or older.⁴ Chronic periodontitis results in the loss of tooth-supporting connective tissue and alveolar bone and, if untreated, is a major cause of tooth loss in adults.⁵ According to the Centers for Disease Control and Prevention and American Academy of Periodontology case definitions,⁶ the prevalences of moderate and severe periodontitis are estimated as 30.0% and 8.5%, respectively, among US adults.⁷

Clinicians are challenged daily with managing periodontitis of varying extent and severity. Treatment options range from SRP to SRP with adjunctive treatments to surgical interventions. In developing these practice guidelines, we considered only

studies that included SRP as part of the test or active control group. Within this guideline, *SRP* is defined as noted in the Code on Dental Procedures and Nomenclature.⁸

- D4341, Periodontal scaling and root planing: "Root planing is the definitive procedure designed for the removal of cementum and dentin that is rough and/or permeated by calculus or contaminated with toxins or microorganisms."

SRP should be differentiated from supra- or sub-gingival debridement as noted in the Code on Dental Procedures and Nomenclature⁸:

- D4355, Full mouth debridement: "The gross removal of calculus that interferes with the ability of the dentist to perform a comprehensive oral evaluation. This preliminary procedure does not preclude the need for additional procedures."

METHODS

The authors constitute a multidisciplinary panel of subject matter experts and ADA staff methodologists convened by the ADA CSA. The accompanying systematic review¹ provides the evidence base for this guideline.

Choice of outcomes measure: CAL. A patient-centered outcome such as functional dentition (tooth loss) or patient satisfaction may provide preferable evidence on periodontal treatment effectiveness; however, periodontal researchers have reported mostly on surrogate outcomes such as probing depth (PD) and CAL. PD is measured from the gingival margin, and the measurement is affected by gingival recession or inflammation, but CAL is measured from a fixed reference point (typically the cemento-enamel junction) and is a more valid metric and a more stable indicator of improvement in periodontal health than PD. We chose to use CAL as the primary outcome to assess periodontal therapies for the following reasons: it is used to measure the clinical effect of SRP^{9,10}; gains in clinical attachment account for roughly 50% of PD reduction after SRP of periodontal pockets with PDs of 4 to 6 millimeters and 7 mm or more^{9,10}; Imrey and colleagues¹¹ recommended that CAL or alveolar bone support be used as a primary outcome in nonsurgical interventional trials of periodontitis, and they also advocated using CAL as an a priori secondary outcome in trials in which bone loss was the primary outcome; and the US Food

ABBREVIATION KEY.

ADA: American Dental Association.
AE: Adverse effect.

CAL: Clinical attachment level.
CSA: Council on Scientific Affairs.
FDA: Food and Drug Administration.
Nd:YAG: Neodymium:yttrium-aluminum-garnet.

PD: Probing depth.
PDT: Photodynamic therapy.
SDD: Subantimicrobial-dose doxycycline.
SRP: Scaling and root planing.



and Drug Administration (FDA) generally has adopted these recommendations in their product and drug approval process for adjuncts. Regardless of the debate regarding use of CAL versus PD, the reference standard for measuring stability or progression of periodontitis remains CAL.^{12,13}

Interpretation of mean change in CAL between treatment and control. In assessing the effectiveness of SRP alone (question 1), we compared mean change in CAL between SRP and controls. To assess adjuncts (question 2), we compared mean changes between groups receiving SRP and those receiving SRP plus an adjunct. For the purposes of interpreting the results, we made a clinical relevance scale before reviewing the results (Table 1). These changes in CAL are not intended

TABLE 1

Clinical relevance scale for interpreting mean differences in clinical attachment level.	
CLINICAL ATTACHMENT LEVEL RANGE (MILLIMETERS)	JUDGED CLINICAL RELEVANCE
0–0.2	Zero effect
> 0.2–0.4	Small effect
> 0.4–0.6	Moderate effect
> 0.6	Substantial effect

to reflect changes in individual tooth attachment measurement experienced in the clinical setting but are statistical calculations used for comparison of overall performance of treatment options. Because we did not include baseline levels of disease in the assessment of mean change in CAL, the values reported herein may underrepresent a true effect if nonsurgical treatment has a greater effect in deeper periodontal sites.

We noted inconsistency among studies regarding the number of tooth sites and teeth assessed. Investigators in some studies reported data for periodontal sites, whereas others reported data at the tooth level and whole-mouth averages. Whole-mouth measurements may lead to underestimation of the treatment effect by including healthy sites in the computation of teeth or mouth averages or of changes over time. The estimates in the meta-analyses include studies in which the investigators reported at these different levels of assessment.

Determining the net benefit rating. The development of evidence-based clinical practice guidelines requires a determination of the net benefit rating for each intervention.¹⁴ We assessed each treatment’s net benefit by evaluating its clinical benefits against its adverse effects (AEs). We evaluated the frequency and severity of AEs as reported in the included

TABLE 2

Balancing level of certainty and net benefit rating to arrive at clinical recommendation strength.			
LEVEL OF CERTAINTY	NET BENEFIT RATING		
	Benefits Outweigh Potential Harms	Benefits Balanced With Potential Harms	No Benefits or Potential Harms Outweigh Benefits
High	Strong	In favor	Against
Moderate	In favor	Weak	Against
Low	Expert opinion for or expert opinion against		

TABLE 3

Definitions for the strength and direction of recommendations.	
RECOMMENDATION STRENGTH	DEFINITION
Strong	Evidence strongly supports providing this intervention. There is a high level of certainty of benefits, and the benefits outweigh the potential harms.
In Favor	Evidence favors providing this intervention. Either there is a high level of certainty of benefits, but the benefits are balanced with the potential harms, or there is a moderate level of certainty of benefits, and the benefits outweigh the potential for harms.
Weak	Evidence suggests implementing this intervention after alternatives have been considered. There is a moderate level of certainty of benefits, and either the benefits are balanced with potential harms or there is uncertainty about the magnitude of the benefit.
Expert Opinion For	Expert opinion suggests this intervention can be implemented, but there is a low level of certainty of benefits, and there is uncertainty in the benefit-to-harm balance.
Expert Opinion Against	Expert opinion suggests this intervention not be implemented because there is a low level of certainty that there is no benefit or the potential harms outweigh benefits.
Against	Evidence suggests not implementing this intervention or discontinuing ineffective procedures. There is moderate or high certainty that there are no benefits or the potential harms outweigh the benefits.



studies or by the FDA. In determining the net benefit rating of each treatment, we judged whether the benefits clearly outweigh the AEs; the benefits and AEs are balanced closely, or there is uncertainty in the estimate of the balance; or the AEs clearly outweigh the benefits.

Determining strength of clinical recommendations. The clinical recommendation strength is a result of crossing the appropriate row (our determination of the level of certainty in the evidence as *high*, *moderate*, or *low* as described by Smiley and colleagues¹) and column (net benefit rating as described in the previous paragraph) of Table 2. Table 3 lists the definitions for each level of recommendation strength.

RESULTS: CLINICAL RECOMMENDATIONS

On the basis of a thorough review of the evidence and an assessment of the benefits and AEs of each therapy, we make the following clinical recommendation statements regarding nonsurgical treatment of chronic periodontitis (Table 4). Table 5 provides the summary of the evidence, following which are evidence profiles for each treatment. A chairside guide that summarizes key information is available at <http://ebd.ada.org/en/evidence/guidelines>.

When considering any intervention, the clinician and patient must balance the potential benefits with the potential AEs. We specifically looked for information on the effect of nonsurgical treatment for chronic periodontitis on caries; however, we found

TABLE 4

Clinical recommendation statements from the American Dental Association Council on Scientific Affairs' Nonsurgical Treatment of Chronic Periodontitis Expert Panel.					
● Strong Evidence strongly supports providing this intervention	● In Favor Evidence favors providing this intervention	● Weak Evidence suggests implementing this intervention only after alternatives have been considered	● Expert Opinion For Evidence is lacking; the level of certainty is low. Expert opinion guides this recommendation	● Expert Opinion Against Evidence is lacking; the level of certainty is low. Expert opinion suggests not implementing this intervention	● Against Evidence suggests not implementing this intervention
CLINICAL RECOMMENDATION					STRENGTH
SRP* (No Adjuncts)					
For patients with chronic periodontitis, clinicians should consider SRP as the initial treatment.					In Favor
SRP With Systemic Subantimicrobial-dose Doxycycline					
For patients with moderate to severe chronic periodontitis, clinicians may consider systemic subantimicrobial-dose doxycycline (20 milligrams twice a day) for 3 to 9 months as an adjunct to SRP, with a small net benefit expected.					In Favor
SRP With Systemic Antimicrobials					
For patients with moderate to severe chronic periodontitis, clinicians may consider systemic antimicrobials as an adjunct to SRP, with a small net benefit expected.					Weak
SRP With Locally Delivered Antimicrobials					
For patients with moderate to severe chronic periodontitis, clinicians may consider locally delivered chlorhexidine chips as an adjunct to SRP, with a moderate net benefit expected.					Weak
For patients with moderate to severe chronic periodontitis, clinicians may consider locally delivered doxycycline hyclate gel as an adjunct to SRP, but the net benefit is uncertain.					Expert Opinion For
For patients with moderate to severe chronic periodontitis, clinicians may consider locally delivered minocycline microspheres as an adjunct to SRP, but the net benefit is uncertain.					Expert Opinion For
SRP With Nonsurgical Use of Lasers					
For patients with moderate to severe chronic periodontitis, clinicians may consider PDT [†] using diode lasers as an adjunct to SRP, with a moderate net benefit expected.					Weak
For patients with moderate to severe chronic periodontitis, clinicians should be aware that the current evidence shows no net benefit from diode lasers (non-PDT) when used as an adjunct to SRP.					Expert Opinion Against
For patients with moderate to severe chronic periodontitis, clinicians should be aware that the current evidence shows no net benefit from neodymium:yttrium-aluminum-garnet lasers when used as an adjunct to SRP.					Expert Opinion Against
For patients with moderate to severe chronic periodontitis, clinicians should be aware that the current evidence shows no net benefit from erbium lasers when used as an adjunct to SRP.					Expert Opinion Against
* SRP: Scaling and root planing. † PDT: Photodynamic therapy.					



TABLE 5

Evidence profile summary.			
THERAPY	LEVEL OF CERTAINTY	BENEFIT*	NET BENEFIT RATING
SRP[†] (No Adjuncts)			
SRP	Moderate	0.49 (0.36–0.62)	Moderate benefit outweighs potential for adverse effects
SRP With Adjuncts			
SRP and systemic SDD [‡]	Moderate	0.35 (0.15–0.56)	Small benefit outweighs potential for adverse effects
SRP and systemic antimicrobials	Moderate	0.35 (0.20–0.51)	Balance between small benefit and potential adverse effects
SRP and chlorhexidine chips	Moderate	0.40 (0.24–0.56)	Balance between moderate benefit and potential adverse effects
SRP and doxycycline hyclate gel	Low	0.64 (0.00–1.28)	Uncertainty in the balance between benefits and adverse effects because benefits are unclear
SRP and minocycline microspheres	Low	0.24 (–0.06 to 0.55)	Uncertainty in the balance between benefits and adverse effects because benefits are unclear
SRP and PDT [§] diode laser	Moderate	0.53 (0.06–1.00)	Uncertainty in magnitude of moderate benefit balanced with potential adverse effects
SRP and diode laser (non-PDT)	Low	0.21 (–0.23 to 0.64)	Evidence of no benefit
SRP and Nd:YAG [¶] laser	Low	0.41 (–0.12 to 0.94)	Evidence of no benefit
SRP and erbium laser	Low	0.18 (–0.63 to 0.98)	Evidence of no benefit
* Benefit is the mean difference (95% confidence interval) in clinical attachment level. Adjunct benefit is over and above SRP alone. [†] SRP: Scaling and root planing. Note that the control group for SRP is no treatment or debridement; for all other treatments, the control is SRP alone. [‡] SDD: Subantimicrobial-dose doxycycline. [§] PDT: Photodynamic therapy. [¶] Nd:YAG: Neodymium:yttrium-aluminum-garnet.			

no information. We screened included articles for potential AEs and considered known potential risks of the included therapies from sources such as the FDA. AEs of nonsurgical periodontal therapy include but may not be limited to the following:

- Reactions to adjunctive medications. Pretreatment screening for allergy, especially to antibiotics, should be performed as part of medical history taking before initiating any treatment, and patients should be closely monitored during therapy.
- Potential injury to patient or operator if any instrument is not used correctly. In particular, we encourage proper training in the use of all lasers for nonsurgical periodontal therapy to ensure the greatest level of safety possible.

We recommend that all nonsurgical adjuncts be used in accordance with the manufacturers' directions.

Scaling and root planing. For patients with chronic periodontitis, clinicians should consider SRP as the initial treatment (*In favor*, Box 1). We note that the strength of the recommendation is limited because SRP is considered the reference standard and thus used as an active control for periodontal trials and there are few studies in which investigators compare SRP with no treatment.

AE assessment. Any type of root planing, including hand and ultrasonic instrumentation, carries the risk of damaging the root surface and potentially causing tooth or root sensitivity. Generally expected post-SRP procedural AEs include discomfort.

Although one study¹⁵ reported a statistically significant difference in pain after treatment and dental hypersensitivity after 1 week, by 3 months no statistically significant differences in these indices were found. Another study¹⁶ reported no differences in pain the day of or the next day after treatment. Investigators in 1 study reported 1 occurrence each of myalgia and granulomatous lesion.¹⁷ Investigators in the remaining studies either reported no AEs or did not include assessment of AEs.^{18–25} Overall, we judged the potential for AEs from SRP to be negligible.



BOX 1

Scaling and root planing clinical recommendation summary.
Level of certainty: Moderate, 11 randomized controlled trials with 331 participants, consistent results, and no serious imprecision
Benefit: Moderate, overall net gain in clinical attachment (mean difference, 0.49 millimeter; 95% confidence interval, 0.36–0.62; improvement)
Adverse effects: Possible pain the day of or the day after treatment, possible increase in dental hypersensitivity within a week; rarer chance of fever or myalgia
Net benefit rating: Moderate benefit of scaling and root planing outweighs potential for adverse effects
Strength of clinical recommendation: In favor

Systemic SDD and SRP. For patients with moderate to severe chronic periodontitis, clinicians may consider systemic SDD (20 milligrams twice a day) for 3 to 9 months as an adjunct to SRP, with a small net benefit expected (*In favor*, Box 2).

AE assessment. Investigators in the studies reported that SDD was well tolerated,²⁶⁻³⁰ with no participants reporting AEs,²⁷⁻³¹ or that the incidence of AEs was similar between the SDD and placebo groups.^{26,32} The AEs that were judged possibly to be related to SDD were dizziness^{26,33} and tachycardia.³³ In 1 study, AEs were reported only in the placebo group.³⁴ Investigators in 3 studies did not report on AEs.³⁵⁻³⁷ The package insert³⁸ lists the most frequent adverse reactions that occurred during clinical trials as headache, common cold, flu symptoms, and toothache. We judged that antimicrobial resistance should not be a factor at subantimicrobial doses. Overall, we judged the potential for AEs from SDD was negligible.

BOX 2

Subantimicrobial-dose doxycycline clinical recommendation summary.
Level of certainty: Moderate, 11 randomized controlled trials with 813 participants, moderately inconsistent results, but no serious imprecision
Benefit: Small, overall net gain in clinical attachment (mean difference, 0.35 millimeter; 95% confidence interval, 0.15–0.56; improvement)
Adverse effects: Most commonly gastrointestinal, although some serious allergic reactions are possible
Net benefit rating: Small benefit outweighs potential for adverse effects
Strength of clinical recommendation: In favor

Systemic antimicrobials and SRP. For patients with moderate to severe chronic periodontitis, clinicians may consider systemic antimicrobials as an adjunct to SRP, with a small net benefit expected (*Weak*, Box 3).

AE assessment. Antimicrobials as a class of drugs are well known to cause allergic reactions in some people. Other AEs commonly are reported (this list is not exhaustive), such as rash, diarrhea, abdominal pain, nausea, or vomiting, although their rates of occurrence are often not statistically different in treated and control groups.^{33,39-48} In addition, the overuse of antimicrobials promotes the development of resistant strains of bacteria, which are a risk to the population.⁴⁹ In general, this class of drugs should be reserved for short-term (less than 21 days) use only, although lower doses may be acceptable over a longer period.

BOX 3

Systemic antimicrobials* clinical recommendation summary.
Level of certainty: Moderate, 24 randomized controlled trials with 1,086 participants, substantial inconsistency between individual trial results, but no serious imprecision
Benefit: Small, overall net gain in clinical attachment (mean difference, 0.35 millimeter; 95% confidence interval, 0.20–0.51; improvement)
Adverse effects: Most commonly gastrointestinal, although some serious allergic reactions are possible, as well as the risk of antimicrobial-resistant bacteria development
Net benefit rating: Balance between small benefit and potential for adverse effects
Strength of clinical recommendation: Weak
* Systemic antimicrobials that were studied include amoxicillin and metronidazole, metronidazole, azithromycin, clarithromycin, moxifloxacin, and tetracyclines (including doxycycline at an antimicrobial dose, 100 milligrams or greater per day).

Locally delivered antimicrobials and SRP. Chlorhexidine chips and SRP. For patients with moderate to severe chronic periodontitis, clinicians may consider locally delivered chlorhexidine chips as an adjunct to SRP with a moderate net benefit expected (*Weak*, Box 4).⁵⁰

AE assessment. Investigators in 2 of the 6 included studies assessed AEs; Sakellari and colleagues⁵¹ reported there were no patient-reported AEs, and Heasman and colleagues⁵² reported 1 case of nontreatment-related aphthae on the buccal mucosa. According to FDA prescribing information, the most frequently observed AEs were toothache, upper respiratory tract infection, and headache.⁵⁰ Oral pain or sensitivity may occur during the first week after SRP and chip placement, although in some cases it may occur later, but it is typically mild to moderate in severity and is expected to resolve within days. Postmarketing surveillance indicates that anaphylaxis, as well as serious allergic reactions, have occurred with dental products containing chlorhexidine.⁵⁰ We note that the products should be applied according to the manufacturers' general instructions.



BOX 4

Chlorhexidine chip clinical recommendation summary.

Level of certainty: Moderate, 6 randomized controlled trials with 316 participants, consistent results, but no serious imprecision

Benefit: Moderate, overall net gain in clinical attachment (mean difference, 0.40 millimeter; 95% confidence interval, 0.24–0.56; improvement)

Adverse effects: Potential toothache, including oral pain or sensitivity, occurred within the first week of the initial chip placement after scaling and root planing procedures, was mild to moderate in nature, and spontaneously resolved within days. Postmarketing surveillance indicates that anaphylaxis, as well as serious allergic reactions, have occurred with dental products containing chlorhexidine.⁵⁰ Patients with known hypersensitivity to chlorhexidine should not receive chlorhexidine chips.

Net benefit rating: Balance between moderate benefit and potential adverse effects

Strength of clinical recommendation: Weak

Doxycycline hyclate gel and SRP. For patients with moderate to severe chronic periodontitis, clinicians may consider locally delivered doxycycline hyclate gel as an adjunct to SRP, but the net benefit is uncertain (*Expert opinion for*, Box 5).

AE assessment. From the included studies, AEs either were not described by the authors, or none were reported by the participants; however, the package insert⁵³ lists several potential AEs with doxycycline hyclate use such as headache, gingival discomfort (pain or soreness), toothache, periodontal problems (abscess, exudate, infection, drainage, extreme mobility, or suppuration), thermal tooth sensitivity, or sore mouth. The package insert⁵³ also states that 1.6% of participants in a doxycycline hyclate (Atridox, CollaGenex Pharmaceuticals) clinical trial of more than 1,400 participants reported “unspecified essential hypertension,” whereas only 0.2% in the vehicle control arm and none in either the SRP or oral hygiene instruction arms reported this AE. There is no known association of oral doxycycline hyclate use with essential hypertension.

BOX 5

Doxycycline hyclate gel clinical recommendation summary.

Level of certainty: Low, 3 randomized controlled trials with 64 participants, moderately inconsistent results, and serious imprecision

Benefit: The best estimate for the treatment effect for scaling and root planing plus doxycycline hyclate gel is a 0.64–millimeter (95% confidence interval, 0.00–1.28) clinical attachment level gain. This is a *substantial* effect; however, *moderate*, *small*, and even *zero* treatment effects are also compatible with the data. Harmful effects from the treatment are improbable.

Adverse effects: Some potential adverse effects, but most are mild and transitory

Net benefit rating: Uncertainty in the balance between benefits and adverse effects because benefits are unclear

Strength of clinical recommendation: Expert opinion for

Minocycline microspheres and SRP. For patients with moderate to severe chronic periodontitis, clinicians may consider locally delivered minocycline microspheres as an adjunct to SRP, but the net benefit is uncertain (*Expert opinion for*, Box 6).

AE assessment. Van Dyke and colleagues¹⁷ reported 1 AE (black hairy tongue) that was ruled to be possibly drug related. Other AEs were reported but judged not to be related to study medication. There was no significant difference in intensity and extent of tooth staining at any assessment point between groups that received or did not receive minocycline. No abnormal clinical chemical or hematologic results were observed in the study for any of the groups.

Williams and colleagues⁵⁴ (the CAL data that are included in Studies 103A⁵⁵ and 103B⁵⁵) reported that the incidence of AEs was similar among treatment groups. The most common AEs included headache, dental infection, increased periodontitis, tooth sensitivity, tooth caries, dental pain, gingivitis, and stomatitis. No clinically significant changes in vital signs or oral hard or soft tissues were noted in these studies. We note that the products should be applied according to the manufacturers' instructions.



BOX 6

Minocycline microspheres clinical recommendation summary.

Level of certainty: Low, 5 randomized controlled trials with 572 participants, moderately inconsistent results, but serious imprecision

Benefit: The best estimate for the treatment effect is a 0.24–millimeter (95% confidence interval, –0.06 to 0.55) clinical attachment level gain. This is a *small* effect. Larger (*moderate*) effects, but also no (*zero*) effects, are also compatible with the data. Notable harmful effects from the treatment are improbable.

Adverse effects: Some potential adverse effects, but most are mild and transitory

Net benefit rating: Uncertainty in the balance between benefits and harms because benefits are unclear

Strength of clinical recommendation: Expert opinion for

Nonsurgical use of lasers and SRP. PDT diode laser and SRP.

For patients with moderate to severe chronic periodontitis, clinicians may consider PDT using diode lasers as an adjunct to SRP, with a moderate net benefit expected (*Weak*, Box 7).

AE assessment. Investigators in several studies reported no AEs. Therapies were well tolerated⁵⁶; healing was uneventful, with no pain or discomfort reported⁵⁷; there was no burning sensation or pain with laser treatment^{58,59}; they observed no major periodontal inflammatory symptoms after instrumentation during the entire study or complications such as infections, suppuration, or abscesses^{60,61}; and there were no complications^{62,64} or AEs.⁶⁵

BOX 7

Photodynamic therapy diode laser clinical recommendation summary.

Level of certainty: Moderate, 10 randomized controlled trials with 306 participants, inconsistent results, and serious imprecision

Benefit: The best estimate for the treatment effect is a 0.53–millimeter (95% confidence interval, 0.06–1.00) clinical attachment level gain. This is a *moderate* effect; however, there is uncertainty in the magnitude: larger (*substantial*) effects, but also no (*zero*) or *small* effects from the treatment are compatible with the data.

Adverse effects: No serious adverse effects reported

Net benefit rating: Uncertainty in magnitude of moderate benefit balanced with potential adverse effects

Strength of clinical recommendation: Weak

Non-PDT diode laser and SRP. For patients with moderate to severe chronic periodontitis, clinicians should be aware that the current evidence shows no net benefit from diode lasers (non-PDT) when used as an adjunct to SRP (*Expert opinion against*, Box 8).

AE assessment. Investigators in 2 studies^{66,67} reported no AEs such as discomfort, burning sensation, dentin hypersensitivity, or pain related to non-PDT laser irradiation. Investigators in the other 2 studies^{68,69} did not assess AEs.

BOX 8

Nonphotodynamic therapy diode laser clinical recommendation summary.

Level of certainty: Low, 4 randomized controlled trials with 98 participants, substantially inconsistent results, and serious imprecision

Benefit: None and could be harmful (loss in clinical attachment with adjunctive non-PDT* laser use compared with scaling and root planing alone, which was not statistically significant [crosses the null]). Overall net loss in clinical attachment (mean difference, 0.21 millimeter; 95% confidence interval, –0.23 to 0.64)

Adverse effects: Investigators in 2 studies reported no adverse effects (such as discomfort, burning sensation, dentin hypersensitivity, or pain related to non-PDT laser irradiation)

Net benefit rating: Evidence of no benefit

Strength of clinical recommendation: Expert opinion against

* PDT: Photodynamic therapy.

Nd:YAG laser and SRP. For patients with moderate to severe chronic periodontitis, clinicians should be aware that the current evidence shows no net benefit from Nd:YAG lasers when used as an adjunct to SRP (*Expert opinion against*, Box 9).

AE assessment. Investigators in 1 study stated that there were no AEs reported, as well as minimal pain.²¹ Investigators in the other 2 studies^{70,71} did not include AE reporting.

BOX 9

Neodymium:yttrium-aluminum-garnet laser clinical recommendation summary.

Level of certainty: Low, 3 randomized controlled trials with 82 participants, moderately inconsistent results, and serious imprecision

Benefit: Uncertain; the best estimate for the treatment effect is a 0.41–millimeter (95% confidence interval, –0.12 to 0.94) clinical attachment level gain. This is a *moderate* effect. Smaller effects (*small* or *zero*), as well as loss in attachment, are compatible with the data

Adverse effects: No serious adverse effects reported

Net benefit rating: Evidence of no benefit

Strength of clinical recommendation: Expert opinion against

Erbium laser and SRP. For patients with moderate to severe chronic periodontitis, clinicians should be aware that the current evidence shows no net benefit from erbium lasers when used as an adjunct to SRP (*Expert opinion against*, Box 10).



AE assessment. Investigators in 1 study¹⁵ reported the occurrence of abscesses—3 in the control group and 2 in the laser group. One patient reported fever in the week after treatment, but the treatment group was not identified.¹⁵ Investigators in the other 2 studies^{72,73} did not report on AEs.

BOX 10**Erbium laser clinical recommendation summary.**

Level of certainty: Low, 3 randomized controlled trials with 82 participants, inconsistent results, and serious imprecision

Benefit: Zero; the best estimate for the treatment effect is a 0.18–millimeter (95% confidence interval, –0.63 to 0.98) clinical attachment level gain. This is a *zero* effect. Larger (*small, moderate, and substantial*) effects are also compatible with the data, as is loss of attachment

Adverse effects: No serious adverse effects reported

Net benefit rating: Evidence of no benefit

Strength of clinical recommendation: Expert opinion against

UPDATING

This clinical practice guideline is scheduled for review and update at 5-year intervals from the date of its publication. In the interim, if new published evidence “shows that a recommended intervention causes previously unknown substantial harm; that a new intervention is significantly superior to a previously recommended intervention from an efficacy or harms perspective; or that a recommendation can be applied to new populations,”⁷⁴ the guideline will be updated as needed.

CONCLUSIONS

A multidisciplinary panel convened by the ADA CSA presents clinical practice guidelines on the nonsurgical treatment of chronic periodontitis by means of SRP with or without adjuncts on the basis of a systematic review of the evidence. For patients with chronic periodontitis, SRP showed a moderate benefit, and the benefits were judged to outweigh potential AEs. We voted *in favor* of SRP as the initial nonsurgical treatment for chronic periodontitis. Although systemic SDD and systemic antimicrobials showed similar magnitudes of benefits as adjunctive therapies to SRP, they were recommended at different strengths (*in favor* for systemic SDD and *weak* for systemic antimicrobials) because of the higher potential for AEs with higher doses of antimicrobials. The strengths of 2 other recommendations are *weak*: chlorhexidine chips and PDT with a diode laser. Recommendations for the other local antimicrobials (doxycycline hyclate gel and minocycline microspheres) were *expert opinion for*. Recommendations for the nonsurgical use of other lasers as SRP adjuncts were limited to *expert opinion against* because there was uncertainty regarding their clinical benefits and benefit-to-AE balance. Note that *expert opinion for* does not imply endorsement but instead signifies that evidence is lacking and the level of certainty in the evidence is low. Ongoing evaluation and maintenance that includes limited SRP is encouraged for care of patients with periodontitis. ■



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