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Simplifying Scaling and Root Planing with Ultrasonics
A Peer-Reviewed Publication
Written by Anastasia L. Turchetta, RDH, AS

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Educational Objectives
Upon completion of this course, the clinician will be able to do the following:
1. Understand the advantages that ultrasonic scaling offers over hand scaling
2. Be knowledgeable about the specific advantages that different types of ultrasonic scalers can offer as well as the risks with ultrasonic scaling, and the importance of an appropriate technique, good visibility and tip movement
3. Be knowledgeable about the adjunctive use of chemotherapeutics, and the specific rationale for the use of irrigants
4. Understand the practice-building considerations in the selection of an ultrasonic unit

Abstract
Scaling and root planing is performed to both disrupt and remove deposits (biofilm and calculus), bacteria and debris from the site. Traditionally, scaling and root planing was accomplished using manual instruments (curettes, chisels and hoes). Increasingly, ultrasonic scaling is becoming the standard for initial periodontal treatment and periodontal maintenance as instrumentation, patient and operator comfort improve. Ultrasonic scaling offers several advantages over hand scaling. Important considerations in the selection of an ultrasonic scaler include ergonomics, patient comfort, convenience and practice building. Recent technologies have enabled ultrasonic scaling to be highly effective as well as compatible with clinical and practice-building goals.

Introduction/Overview
Periodontal disease is a chronic infection that consists of an intricate matrix of subgingival biofilm containing periodontal pathogens, with progression determined by genetic, environmental or acquired factors of the host. It is the thorough removal of the periodontal matrix, which includes A. actinomycetemcomitans and P. gingivalis that is essential for maintaining total health. The ongoing presence of periodontal biofilm following treatment will yield results with less than optimal outcomes. Scaling and root planing remain the standard-of-care for the non-surgical treatment of periodontal disease. Instrumentation selection is crucial for eliminating toxins, promoting patient comfort, while reducing fatigue for the clinician.¹

During scaling and root planing the meticulous removal of deposits, endotoxins and debris and achieving a smooth root surface reduces the potential for bacterial recolonization post-treatment. Physical challenges to scaling and root planing include crevices, concavities and furcations, and bacterial invasion of tubules and soft tissue. Scaling and root planing is a proven protocol, in addition to potentially utilizing adjunctive therapy, improving clinical parameters — reducing the gingival index, plaque index, bleeding upon probing and probbing depth and encouraging clinical attachment gain.²

Scaling and Root Planing
Manual versus Ultrasonic Instrumentation
Traditionally, scaling and root planing was accomplished using a selection of manual instruments consisting of curettes, chisels and hoes. Increasingly, ultrasonic scaling is becoming a preferred choice for initial periodontal treatment and periodontal maintenance protocols as instrumentation, patient and operator comfort improve.³ Clinicians can select hand scaling, ultrasonic scaling or a two-step protocol — whereby ultrasonic scaling removes (gross) deposits and hand scaling is then used for fine calculus or biofilm removal. One study found no significant difference in treatment outcomes between ultrasonic scaling alone when followed by hand scaling as the final step.⁴ Ultrasonic scalers have been found to be effective in removing subgingival biofilm and calculus. Aggressive treatment of the root surface was believed to be necessary to remove embedded endotoxins, but it is now known that endotoxins are only loosely adsorbed on the root surface and their removal requires only light use of ultrasonic insert tips.⁵ Based on these considerations, a two-step protocol involving ultrasonic scaling followed by extensive hand scaling (rather than spot touch-ups in specific areas) may offer little benefit.

Ultrasonic Scalers
Ultrasonic scaling offers several advantages over hand scaling. It is less fatiguing and less time consuming, requires less force, results in less tooth substance loss, is more effective in areas with narrow difficult root morphology, and provides lavage to the pocket during instrumentation. With respect to root surface loss, Ritz et al. found that hand scaling with a curette resulted in a loss of 109 microns of cementum compared to 12 microns with an ultrasonic scaler, after 12 working strokes.⁶ The whole root surface must be instrumented with gentle and precise overlapping strokes of the selected scaling instrument. Piezoelectric and magnetostrictive ultrasonic scalers differ. Piezoelectric tip movement is obtained through the use of ceramic discs. Magnetostrictive ultrasonic insert movement is obtained through the use of metal stacks of ferromagnetic material that create a magnetic field.

Procedure and technique
Piezoelectric tips move linearly (in straight lines), mimicking the motion of hand scaling (Figure 1). Piezoelectric insert tips include beveled, bladed, slim and probe-like designs, depending on the particular unit. For most units, several insert tips are used during the procedure. The scaler insert tips are most active on the two lateral surfaces (Piezos® Master, EMS; Mini Piezos®, EMS; Symmetry IQ®, Hu-Friedy; Varios 350, Brasseler; Suprason P-Max, Satelac/Aceton). Only these active lateral surfaces are necessary to remove embedded endotoxins, but it is now known that endotoxins are only loosely adsorbed on the root surface and their removal requires only light use of ultrasonic insert tips.¹ Based on these considerations, a two-step protocol involving ultrasonic scaling followed by extensive hand scaling (rather than spot touch-ups in specific areas) may offer little benefit.

One unit uses just one insert tip (Pro-Select® Platinum, Pro-Dentec, a Zila, Inc. Company) — this insert’s tip is probe-shaped and rounded and necessitates only very light force (3–5 grams). The full circumference of its rounded shape is active and can be used against the root surface (as opposed to only the lateral sides of other piezoelectric scalers’ insert tips) (Figure 2). As with all other piezoelectric units the tips should not be pointed at the tooth surface at a 90-degree angle, to avoid gouging. Magnetostrictive ultrasonic inserts move elliptically (Figure 3). Magnetostrictive scalers (Cavitron®, Dentsply®; Dual Select™, Dentsply®) use a variety of insert tip shapes
adaptation can be a reason for hand scaling following ultra-rounded surfaces to a concave or convex root surface. Lack of...
the ultrasonic tip are required. Piezoelectric ultrasons generates less heat than magnetostrictive units, reducing the amount of coolant required.

**Bacterial aerosols**

Ultrasonic scaling creates a bacterial aerosol, and the use of more coolant results in more bacterial aerosol. High-suction devices can be used to reduce bacterial aerosolization while ensuring that the coolant is not suctioned away before it has bathed the tooth surface. Focused-spray magnetostrictive ultrasonic inserts (Cavitron®, Dentply®) are directional and designed to reduce atmospheric bacterial contamination and the amount of coolant, and to increase patient comfort.18 The bacterial aerosol produced using a piezoelectric ultrasonic scaler was found in one study to be limited.18

**Ergonomics**

The choice of ultrasonic unit and insert tips, operator movements and positioning, and patient positioning all influence ergonomics. With the patient and clinician in ergonomically correct positions, muscle strain and fatigue are reduced and visibility improved. Using magnifying loupes assists visibility. LED lights (Pro-Select® Platinum, Protege™) and fiber optics (Symmetry IQ™, Varios 350) are available on some ultrasonic handpieces to improve visibility. The use of units with directed focused spray (Cavitron®) or piezoelectric units requiring less coolant spray or utilizing a light mist (Pro-Select® Platinum) also improves visibility. Improving visibility can help reduce bending and twisting of the neck in the attempt to see well.

Finger and wrist positioning and the force required for scaling affect muscle strain and pinching. Ultrasonic scaler use minimizes the force that is needed while using soft tissue rests, and compared to hand scaling it reduces the intricacy of movement and muscle fatigue. Tactile sensitivity is also improved. Fatter, lighter-handled ultrasonic inserts are better than slimmer, heavy ultrasonic inserts. To access tissue rests, and compared to hand scaling it reduces the instrumentation and improves the experience for patient and clinician alike. Discomfort and or sensitivity can result from poor technique (force applied, rough instrumentation, inappropriate use of insert tips) and factors related to the coolant (too much or too little, or wrong temperature), as well as incorrect patient positioning — this last is a factor with all ultrasonic units and the clinician must make sure the patient is in a comfortable position that is also ergonomically appealing to the clinician. Patient positioning is a factor with all instrumentation.

Inert tip choice and use are critical. Wider insert tips result in more tissue distension than slim or probe-like insert tips. Tissue distension may be less with ultrasonic scaling than with hand scaling due to tip positioning coronal to calculus deposits rather than apical to them. With ultrasonic scaling, in general using magnetostrictive insert tips (Cavitron®) with less critical demands with respect to the active sides may reduce angulation issues, or piezoelectric tips with rounded surfaces that are active around their full circumference (Pro-Select® Platinum) eliminate the need to pivot the wrist, and also require less applied force than other units, thereby reducing fatigue, wear and muscle strain.

Other considerations include the number of actions required to change the functionality of the unit and inserts. The more inserts required for a procedure, the more the clinician needs to stop and change positions to adapt different insert tips before continuing the procedure. Using fewer inserts is desirable from this perspective. Remote or wireless foot controls enable comfortable and flexible positioning for the operator. Generally, the more functionality obtained of the difference in motion. Some studies, however, have found no differences in patients’ pain perception whether treated with a magnetostrictive or piezoelectric scaler.19,20

The dampening effect that occurs with some ultrasonic scalers that slow the tip movement down to 15–20 cps has the potential to result in patient discomfort. Selecting a unit that operates at a higher frequency helps. In addition, utilizing a unit that enables the tip to automatically speed up when it encounters calculus and then slow down helps the clinician avoid having to apply more force. Light contact of ultrasonic insert tips results in less patient discomfort and

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**Table 2: Advantageous Ergonomic Features**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Product(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All surfaces of tips active —</td>
<td>Pro-Select® Platinum, Cavitron®</td>
</tr>
<tr>
<td>Minimum number of inserts required —</td>
<td>Pro-Select® Platinum</td>
</tr>
<tr>
<td>LED handpiece light —</td>
<td>Discus Protege™, Pro-Select® Platinum</td>
</tr>
<tr>
<td>Fiberoptic handpiece light —</td>
<td>Symmetry IQ™, Varios 350</td>
</tr>
<tr>
<td>Swiveling handpiece —</td>
<td>Cavitron®</td>
</tr>
<tr>
<td>Focused spray or light might spray —</td>
<td>Pro-Select® Platinum</td>
</tr>
<tr>
<td>Closed system for irrigant —</td>
<td>Pro-Select® Platinum, Turbo Piezo, Suprasson P-Max, Piezon® Master</td>
</tr>
<tr>
<td>Remote or wireless foot controls —</td>
<td>Multifunctional foot controls used for closed irrigant systems — Cavitron®, Pro-Select® Platinum</td>
</tr>
<tr>
<td>Lighter force required —</td>
<td>Lighter, fatter inserts</td>
</tr>
<tr>
<td>Platinum, Dual Select™, Cavitron®, Suprasson P-Max, Piezon® Master)</td>
<td></td>
</tr>
</tbody>
</table>

**Patient comfort**

Patient comfort improves patient compliance with treatment and improves the experience for patient and clinician alike. Discomfort and or sensitivity can result from poor technique (force applied, rough instrumentation, inappropriate use of insert tips) and factors related to the coolant (too much or too little, or wrong temperature), as well as incorrect patient positioning — this last is a factor with all ultrasonic units and the clinician must make sure the patient is in a comfortable position that is also ergonomically appealing to the clinician. Patient positioning is a factor with all instrumentation.

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less post-operative sensitivity. Too much coolant or lavage can result in the patient choking or feeling uncomfortable. Piezoelectric units require less lavage than the magnetostriuctive units (which generate more heat). One technology uses only a light mist sufficient for lavage and not required for cooling of the tip itself (Pro-Select® Platinum).

Sensitivity can result from too much lateral pressure or force being applied, leaving the tip too long in one spot; incorrect tip placement; instrumentation on already exposed dentin; exposure to coolant; and heat generation. Fluoride has been used to reduce sensitivity by applying it pre-operatively or post-operatively. The combination of chlorhexidine and fluoride as sequential rinses was found in one study to be more effective against sensitivity at two weeks than the use of either alone.24 The manufacturer of one piezoelectric scaler (Pro-Select® Platinum) recommends their combined use at a warm temperature, enabled by heating through the irrigator handpiece to provide a fluoride-rich environment and to reduce sensitivity.

### Adjunctive Chemotherapeutic Therapy

Adjunctive therapy is intended to prevent the continued presence of pathogenic bacteria at treated sites and to increase the effectiveness of periodontal treatment. It is not intended to replace standard non-surgical periodontal therapy (scaling and root planing). Systemic therapeutics, locally-applied therapeutics, rinses and irrigants have all been used adjunctively to mechanical therapy.

### Systemic therapies

Antibiotics typically used include tetracycline and metronidazole, with selection based on the target bacteria, potential for side effects and allergies. Bacterial resistance is a major drawback of systemic antibiotics, and in this regard other adjunctive therapeutic antibacterial/antimicrobial vehicles are preferable. Submicrobial levels of doxycycline (Periostat) are used to help prevent the breakdown of collagen by reducing the availability of the enzyme collagenase. Studies have found pocket depth reductions of up to 67% and clinical attachment gain of up to 52% at three months following treatment of severe periodontitis with doxycycline.22,23 The standard dose of Periostat offers no antimicrobial effect and is used as an adjunct to periodontal therapy.

### Locally-applied chemotherapeutics

These are placed directly into the periodontal pockets, where they remain at high concentrations for extended periods of time, and have been found to be effective in nonsmokers, smokers and diabetics with periodontal disease. Improved levels of clinical attachment gains, reductions in pocket depths and reductions in bleeding upon probing have been found with their use.24–26 Various agents and vehicles may be used (Table 3).

### Rinsing, ultrasonic lavage and irrigation

In any discussion of topical adjunctive therapy it is important to note the distinction between lavage during ultrasonic instrumentation and irrigation as a separate procedure. Irrigants can be used during ultrasonic scaling and root planing as lavage, after instrumentation as an additional (billable) procedure, and at home by the patient. Subgingival lavage during instrumentation enables direct placement of the agent into the pocket. Chemotherapeutic agents may include chlorhexidine, fluorides (over 1000 ppm), and povidone-iodine, all of which have been shown to be bactericidal. Their use results in bacterial cell death by various mechanisms.

In one study, chlorhexidine lavage during scaling and root planing resulted in greater probing-depth reductions at 28 days compared to using sterile water. Probing depth reduction was found to be greater in deeper (4–6mm) pockets, than shallow (1–3mm) pockets.27 Kamagate et al. concluded in their study that ultrasonic lavage with CHX resulted in slightly greater reduction in plaque index, gingival index and bleeding-upon-probing compared to both water and sodium hypochlorite.28 Taggert et al. found that chlorhexidine lavage during ultrasonic instrumentation had a slight additive effect in reducing probing depths.29 A review by Hanes and Purvis found no statistically significant effect for adjunctive use of CHX during ultrasonic lavage.30 Subgingival irrigation with chlorhexidine, together with chlorhexidine rinsing and tongue-brushing has been studied for mouth disinfection (albeit with stronger concentrations of CHX available here commercially).31–33 Studies on non-periodontal patients on the effect of a single subgingival irrigation using 0.2% chlorhexidine found significantly greater reductions in plaque index and probing depths compared to irrigation with saline in orthodontic patients, and gingival bleeding was almost absent at four weeks.34 Irrigation using fluoride has also been investigated. An in vitro study looked at the effect of different concentrations of NaF on periodontal pathogens. The minimum inhibitory concentrations (MIC) were found to be 128 micrograms/ml for P. gingivalis and A. actinomycetemcomitans, and 1024 micrograms/ml for P. intermedius. The researchers concluded that sodium fluoride was effective against these pathogens.35 A separate study found that neither use of chlorhexidine nor stannous fluoride provided adjunctive benefits to scaling and root planing over four weekly sessions.36 There is evidence that combining chlorhexidine and fluoride results in greater inhibition of plaque and few colony-forming units (CFUs).37

### Table 3: Locally-applied sustained-release chemotherapeutics

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periochip</td>
<td>2.5 mg CHX; inserted as a thin, solid chip of biodegradable gelatin-glutaraldehyde matrix. 40% of CHX is released within 24 hours, the remainder over the course of the 7 day treatment.</td>
</tr>
<tr>
<td>Arestin</td>
<td>1 mg minocycline hydrochloride, locally applied by syringe as bioadhesive absorbable microspheres in a dry powder. Remains in the pocket for 14 days</td>
</tr>
<tr>
<td>Williams et al.</td>
<td>Reduced pocket depth in molar areas, effective in furcations</td>
</tr>
<tr>
<td>Atridox</td>
<td>10% doxycycline hyclate; 7-day treatment</td>
</tr>
<tr>
<td>Martorelli et al.</td>
<td>Significantly greater reduction in probing depth clinical attachment gain at 12 months in Type I diabetics with adjunctive use</td>
</tr>
<tr>
<td>Machion et al.</td>
<td>Increases in attachment gains at periodontal sites in smokers</td>
</tr>
</tbody>
</table>
One study comparing ultrasonic scaling lavage with or without 0.5% povidone-iodine found no additive effect.29 Leonhardt et al., and Zanatta et al. at 3-month evaluation, found no additive effect.40,41 On the other hand, Forabosco et al. used a 10% iodized solution adjunctive to ultrasonic scaling and found that clinical parameters were significantly improved compared to the control group.42 Rosling et al. showed that PVP-iodine used during ultrasonic instrumentation was more effective during active therapy than controls.43 Hoang et al. compared scaling and root planing with 10% PVP-iodine or sterile saline, and scaling and root planing with adjunctive irrigation using 10% PVP-iodine. Five weeks after treatment, results indicated that the combined therapy resulted in at least a 95% reduction in total pathogen counts in 44% of pockets at least 6mm in depth vs. an improvement of 6–13% in the controls. Reductions in mean pocket depth were also greater for the combined therapy.44

While clinical results have varied using chlorhexidine — the gold standard chemotherapeutic for inflammatory control in periodontal therapy — its utility for long-term beneficial effects is controversial. Some studies have shown short term improvements in clinical parameters, especially in the post-therapy healing phase.45 It has been shown that topical application of CHX with rinsing, and especially applying it to the tooth-soft tissue interface with a rotary mechanical brush significantly reduces the plaque, bleeding and gingival indices.46 The use of chemotherapeutics has also been advocated to reduce the bacterial load in aerosols, using chlorhexidine or other antiseptics as a pre-procedural rinse. Some studies have found significant reductions in bacterial loads in aerosols using CHX as well as other antimicrobials after a single rinse.47,48 Pre-procedural irrigation provides similar benefits.

Considerations
Subgingival irrigation is influenced by insert tip design, irrigation tip design and tip placement. Blomlöf et al. found that the clinical effect of an irrigant was negligible with conventional application and that application with a customized tip directly at the working surface of the insert tip was required.49 Another study using erythrosin dye flowing through the insert tip in pockets at least 3 mm deep found that lateral dispersion adjacent to the tip was minimal. For an irrigant to be effectively dispersed, it was concluded that the full root surface must be instrumented.50 Once mature biofilm is disrupted by ultrasonic scaling it is no longer intact, enabling contact of the irrigant with biofilm previously protected by its outer layers. This underlines the importance of fully instrumenting pockets while irrigating. Temperature may influence the microbial effectiveness of irrigants. Warm chlorhexidine gluconate at 47°C reduces plaque vitality at one hour post-rinsing significantly more than cold chlorhexidine (at the same concentration) at 18°C (from 98.98% to 51.77%, and 99.63% to 77.81%, respectively) and has a more intensive antiplaque effect.51 Therefore, use of heated irrigant (Pro-Select® Platinum) may improve microbial reductions. A number of ultrasonic scalers have closed irrigation systems. Using a closed system helps to ensure that the irrigant is not contaminated, and enables the clinician to easily irrigate the area during scaling and root planing. Systems with more than one bottle that can be easily switched enable selection of one or more during the procedure (Pro-Select® Platinum, Pro-Dente; Dual Select™, Dentsply®; Suprasson P-Max, Satelac/Ace- ton; Piezon® Master, EMS).

Practice building
It takes less time to complete a scaling and root planing effectively with ultrasonic scaling than with hand scaling. This is supported by the findings of Copulos et al. and Dragoo that ultrasonic scaling took approximately 34% and 29%52,53 less time. Busslinger et al. found that, compared to hand scaling, scaling a tooth took approximately 17% less time with magnetostriictive scaling and approximately 41% less time with piezolectric scaling for similar results.54 A timed debriedment found that for a given time (490 seconds) ultrasonic scaling was significantly more effective than hand scaling.55 Using a technique that results in greater patient comfort also has the potential to save time.

Using probe-like ultrasonic insert tips improves productivity by allowing the clinician to stop the tip’s motion and to use it for tactile identification of root morphology, residual calculus and the base of pockets rather than having to pick up a manual probe or explorer. Probe-like tips and the application of light pressure only can also reduce the need for anesthesia. Other time-saving features of ultrasonic scalers include the use of remote control foot pedals, the use of fewer insert tips (Piezo) or one insert tip (Pro-Select® Platinum), and the use of a foot pedal to control irrigant use. In addition, irrigation performed with scaling and root planing is a separate billable procedure.

Summary
Ultrasonic scaling is increasingly the method of choice for non-surgical periodontal therapy. Recent technologies have enabled ultrasonic scaling to be highly effective as well as compatible with clinical and practice-building goals.

References
Questions

1. The ongoing presence of periodontal bacteria following therapy results in poor treatment outcomes.
   a. True
   b. False

2. The primary objective of scaling and root planing is _________.
   a. to create a surface compatible with plaque
   b. to remove the periodontal membrane
   c. to create a biologically compatible root surface
d. none of the above

3. Endotoxins are __________.
   a. irrelevant to treatment outcomes
   b. deeply embedded in the root
   c. only loosely adsorbed on the root surface
d. a and c

4. In comparison to hand scaling, ultrasonic scaling__________.
   a. is less fatiguing
   b. requires less force
c. provides lavage to the pocket during instrumentation
d. all of the above

5. Piezoelectric tips move ________, while magnetostrictive inserts move _________.
   a. linearly; obliquely
   b. diagonally; linearly
c. linearly; elliptically
d. elliptically; linearly

6. When using piezoelectric tips that have active lateral sides, only those sides should be in contact with the teeth.
   a. True
   b. False

7. The full circumference of rounded piezoelectric tips is active and can be placed in contact with the teeth.
   a. True
   b. False

8. The ability to use all surfaces or the full circumference of a tip _________.
   a. makes the procedure less technique-sensitive
   b. provides better adaptation to the root surface
c. is pointless
d. all of the above

9. The width of a furcation at its narrow point is 0.63 mm, while the width of a Gracey curette is 0.76 mm. As a result, the curette cannot instrument the furcation fully.
   a. True
   b. False

10. Pacemakers can be interfered with by _________.
    a. piezoelectric ultrasonic scalers
    b. magnetostrictive ultrasonic scalers
    c. composite restorations
d. a and b

11. Flemming et al. found that tip angulation was more critical when using a magnetostrictive unit than when using a piezoelectric unit.
    a. True
    b. False

12. Horton found that piezoelectric scaling resulted in a smoother root surface than did scaling with a magnetostrictive scaler.
    a. True
    b. False

13. Piezoelectric tips that are round (Pro-Select® Platinum) _________.
    a. can be used on all surfaces
    b. do not require special angulation
c. are available with all piezoelectric units
d. a and b

14. With respect to bacterial aerosols generated during ultrasonic scaling procedures, _________.
    a. the use of more coolant results in more aerosol being created
    b. pre-procedural rinsing has been recommended to reduce the bacterial load
c. in one study the use of a piezoelectric scaler was found to generate a limited amount of aerosold. all of the above

15. The clinician’s muscle strain and fatigue are reduced and visibility can be improved _________.
    a. when the patient is standing upright
    b. when the clinician is in an ergonomic position
c. when the clinician stands
d. all of the above

16. Ultrasonic scaler use minimizes the force that is needed while using soft tissue rests, and compared to hand scaling it _________.
    a. reduces the intricacy of movement
    b. increases muscle fatigue
c. reduces muscle fatigue
d. a and c

17. While performing ultrasonic scaling, visibility can be improved by _________.
    a. positioning the patient appropriately
    b. using an ultrasonic handpiece with an LED
c. using an ultrasonic handpiece with fiberoptics
d. all of the above

18. Increasing patient comfort improves _________.
    a. patient compliance
    b. the experience for the clinician
c. the experience for the patient
d. all of the above

19. Using slim inserts rather than wider inserts can reduce tissue distension _________.
    a. True
    b. False

20. The points (ends) of piezoelectric insert tips can safely be used against the tooth _________.
    a. True
    b. False

21. The points (ends) of magnetostrictive insert tips can safely be used against the tooth _________.
    a. True
    b. False

22. Adjunctive therapy is intended to _________.
    a. prevent the continued presence of pathogenic bacteria at treated sites
    b. increase the effectiveness of periodontal treatment
c. remove the need for scaling and root planing
d. a and b

23. Locally applied sustained-release chemotherapeutics have been found to be effective in nonsmokers, smokers and diabetics with periodontal disease.
    a. True
    b. False

24. Povidone-iodine and chlorhexidine gluconate _________.
    a. are both bactericidal
    b. have both been used as subgingival irrigants
c. have both been used to reduce bacterial loadsd. all of the above

25. Subgingival irrigation is influenced by _________.
    a. insert tip and irrigation tip design
    b. brand of suction device
c. tip placement
d. a and c

26. Warm chlorhexidine gluconate was found in one study to reduce plaque vitality at one hour post-rinsing significantly more than cold chlorhexidine did.
   a. True
   b. False

27. Using a closed irrigant system _________.
    a. makes it more difficult to irrigate subgingivally
    b. helps to ensure that the irrigant is not contaminated
c. incurs extra cost
d. a and b

28. Dragoo found that ultrasonic scaling took ________ less time than hand scaling.
    a. 29 percent
    b. 31 percent
    c. 35 percent
d. 39 percent

29. Using probe-like ultrasonic insert tips improves productivity by _________.
    a. allowing the clinician to stop the tip’s motion and use it for tactile identification of root morphology
    b. reducing the need to scale and root planec. reducing the need to locate the base of pockets
d. all of the above

30. Irrigation performed with scaling and root planing is a separate billable procedure.
    a. True
    b. False
Simplifying Scaling and Root Planing with Ultrasonics

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete all information above. 3) Complete answer sheets in either pen or pencil. 4) Mark only one answer for each question. 5) A score of 70% on this test will earn you 4 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp.

Educational Objectives
1. Understand the advantages that ultrasonic scaling offers over hand scaling.
2. Be knowledgeable about the specific advantages that different types of ultrasonic scalers can offer as well as the risks with ultrasonic scaling, and the importance of an appropriate technique, good visibility and tip movement.
3. Be knowledgeable about the adjunctive use of chemotherapeutics, and the specific rationale for the use of irrigants.
4. Understand the practice-building considerations in the selection of an ultrasonic unit.

Course Evaluation
Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

1. Were the individual course objectives met?
   Objective #1: Yes No
   Objective #2: Yes No
   Objective #3: Yes No
   Objective #4: Yes No
2. To what extent were the course objectives accomplished overall?
   5 4 3 2 1 0
3. Please rate your personal mastery of the course objectives.
   5 4 3 2 1 0
4. How would you rate the objectives and educational methods?
   5 4 3 2 1 0
5. How do you rate the author’s grasp of the topic?
   5 4 3 2 1 0
6. Please rate the instructor’s effectiveness.
   5 4 3 2 1 0
7. Was the overall administration of the course effective?
   5 4 3 2 1 0
8. Do you feel that the references were adequate?
   Yes No
9. Would you participate in a similar program on a different topic?
   Yes No
10. If any of the continuing education questions were unclear or ambiguous, please list them.

11. Was there any subject matter you found confusing? Please describe.

12. What additional continuing dental education topics would you like to see?

13. Did you have any difficulty completing the survey? Please describe.

Mail completed answer sheet to
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