

SMS

self-study course

course 3 | summer 2022



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ALL ABOUT ULTRASONIC SCALING

about this course...

The purpose of this self-study is to provide the dental professional with a review of necessary information about **ultrasonic scaling** and its effectiveness for patient care. This course will provide a brief overview of power scaling and associated terminology, and a thorough overview of ultrasonic scaling, in hopes of encouraging the utilization of ultrasonic scaling as a **standard of practice**.

All of the content within this self-study is designed to provide both recent graduates and experienced clinicians with evidence-based information (and resources) that can be used during patient care. Specifically, this course is designed to aid the clinician in making appropriate clinical decisions related to ultrasonic instrumentation, promoting optimal patient care.

course 03

summer 2022

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COURSE

learning objectives

KEY TERMS

The following terminology is essential for understanding the mechanism of action related to power scaling.

frequency

The number of times an instrument tip vibrates or cycles, per second (cps).

power control

The adjustment mechanism found on the device used to control the amplitude.

amplitude

The distance the tip moves or the length of the stroke. Amplitude is affected by power level.

lavage

The flow of water from the tip of the insert.

Upon completion of this course, the participant will be able to:

- define power scaling
- define ultrasonic scaling
- describe the difference power scaling & ultrasonic scaling
- classify the two different types of ultrasonic scaling
- describe the properties of both types of ultrasonic scaling
- recognize the advantages of ultrasonic scaling
- identify the disadvantages of ultrasonic scaling
- identify the clinical applications related to ultrasonic scaling
- define the contraindications associated with ultrasonic scaling
- list steps for selecting the most appropriate ultrasonic insert
- identify the differences in insert & tip shapes
- select the most appropriate tip design for debridement
- recognize insert tip wear indicating replacement
- compare functioning from non-functioning ultrasonic equipment
- describe the clinician's role in utilizing ultrasonic technology

introduction to

POWER SCALING

The integration of power scaling within clinical dentistry has evidenced innovation and advancement in patient care over the last 60 years. Power scaling devices are electronically powered machines that generate electrical currents, producing rapid vibrations through the handpiece to the tip of the insert. The evolution of power scaling devices has introduced a variety of designs and two general categories: sonic scalers and ultrasonic scalers. This course directly focuses on ultrasonic scalers, exploring their effectiveness in treating a wide range of patients.

CATEGORIES of power scaling devices

There are two general categories of power scaling devices:

- **SONIC SCALERS**
- **ULTRASONIC SCALERS**

SONIC SCALERS

A sonic scaler unit attaches directly to the dental unit tubing and is activated by the unit's foot control. Of the two types of power scalers, the sonic scaler is less frequently used.

As a clinician, it is important to identify the application of the two categories of power scaling devices. As there continues to be a universal shift toward the use of ultrasonic scalers over sonic scalers, this course primarily highlights the use of ultrasonic devices.

Mechanism of Action

With sonic scalers, compressed air moves through the handpiece, causing the tip to vibrate in an orbital pattern. Water flows through the handpiece to dissipate heat.





ULTRASONIC SCALERS

Ultrasonic units have their own electric generator, separate from the dental unit. They also have their own foot pedal which attaches to the device itself. There are two types of ultrasonic scaler devices: **magnetostrictive** and **piezoelectric**.

MAGNETOSTRICTIVE

Mechanism of Action

Energy is transferred through flat metal strips in a stack or a metal rod, causing them to shorten and lengthen. The dimensional changes causes the tip attached at the end of the insert to move in an elliptical pattern. All areas of the tip become active, heat is produced and water is used to dissipate the heat.

PIEZOELECTRIC

Mechanism of Action

Energy is transferred through crystals housed within the hand-piece, causing them to change in size. The dimensional change causes the tip (screwed into the handpiece) to move in a primarily linear pattern. Only the two lateral sides of the tip become active. Little heat is generated, minimizing the amount of water needed for dissipation.

**** this self study highlights the use of magnetostrictive devices*

ADVANTAGES & DISADVANTAGES of power scaling

Power scaling units possess advantages as a supplemental treatment modality to manual instrumentation. Similarly, they present with disadvantages that can affect patient care.

advantages

- lavage
- efficiency
- improved operator ergonomics
- conservation of root surface
- no sharpening of insert tips required

disadvantages

- aerosol production
- patient acceptance
- contraindications in some patients

introduction to

ULTRASONIC SCALING

Ultrasonic scaling is an effective and efficient method of treatment for all types of periodontal procedures. Ultrasonic instrumentation should be **considered as a standard of practice** when treating periodontally involved patients, recall patients, and periodontal maintenance patients.

ADVANTAGES of ultrasonic scaling

Ultrasonic scaling is advantageous in many ways and its use in periodontal therapy is increasingly supported by research. However, there remains an insufficient amount of research regarding its superiority over manual instrumentation. Regardless, there is evidence supporting such advantages, encouraging the use of ultrasonic scaling at the forefront of treatment modalities.

- **mechanical removal of plaque & calculus**

The ultrasonic insert tip moves in an extremely fast motion, at a frequency of 18,000 to 50,000 cps. This motion is precise, producing longitudinal sweeping motions that cannot be created by hand scaling. When the tip contacts the calculus and bacteria, it is mechanically removed.

- **cavitation (unique to ultrasonic scaling)**

The rapid movement of bubbles occur at the tip of the insert. The bubbles form within the fluid medium, grow, then implode. As a result, shock waves form, creating energy and heat, ultimately leading to the disruption of bacteria and deposits.

- **acoustic streaming**

The uni-directional fluid flow caused by ultrasound waves. As the water flows over the vibrating tip of the insert it is directed into the periodontal pocket, helping to disrupt bacteria.

- **acoustic turbulence**

The swirling effect created when the movement of the tip causes the fluid to accelerate. This swirling effect is localized within the periodontal pocket, helping to disrupt bacteria.

Additional benefits of ultrasonic scaling include:

- conservation of root surface
- bactericidal effects
- improved operator ergonomics
- subgingival pocket and furcations
- no sharpening of insert tips required



INDICATIONS

for ultrasonic scaling

Ultrasonic scalers are indicated for all types periodontal procedures that involve the debridement of calculus and the disruption and removal of biofilm

CONTRAINDICATIONS

for ultrasonic scaling

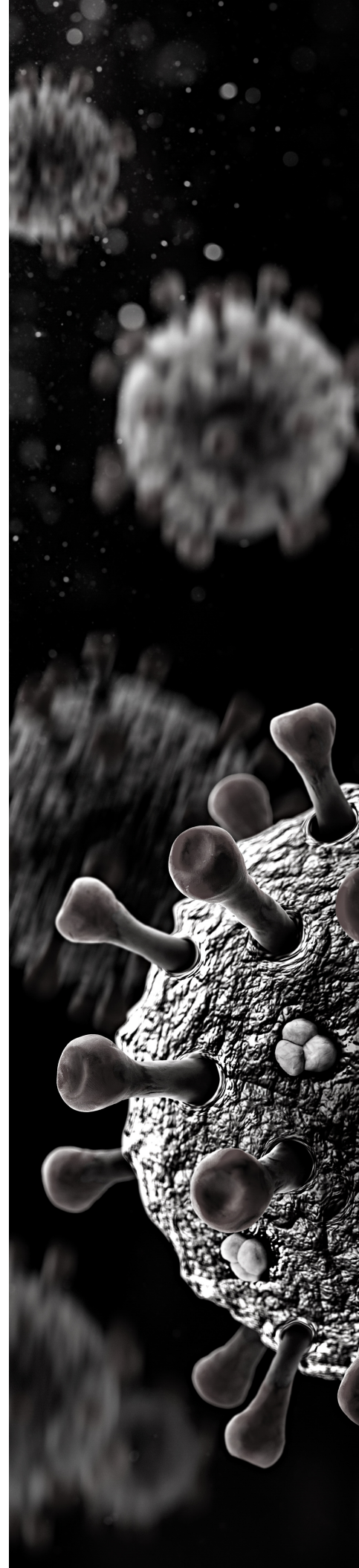
Ultrasonic scalers are **not recommended** for use in the following patient situations that involve systemic and oral conditions:

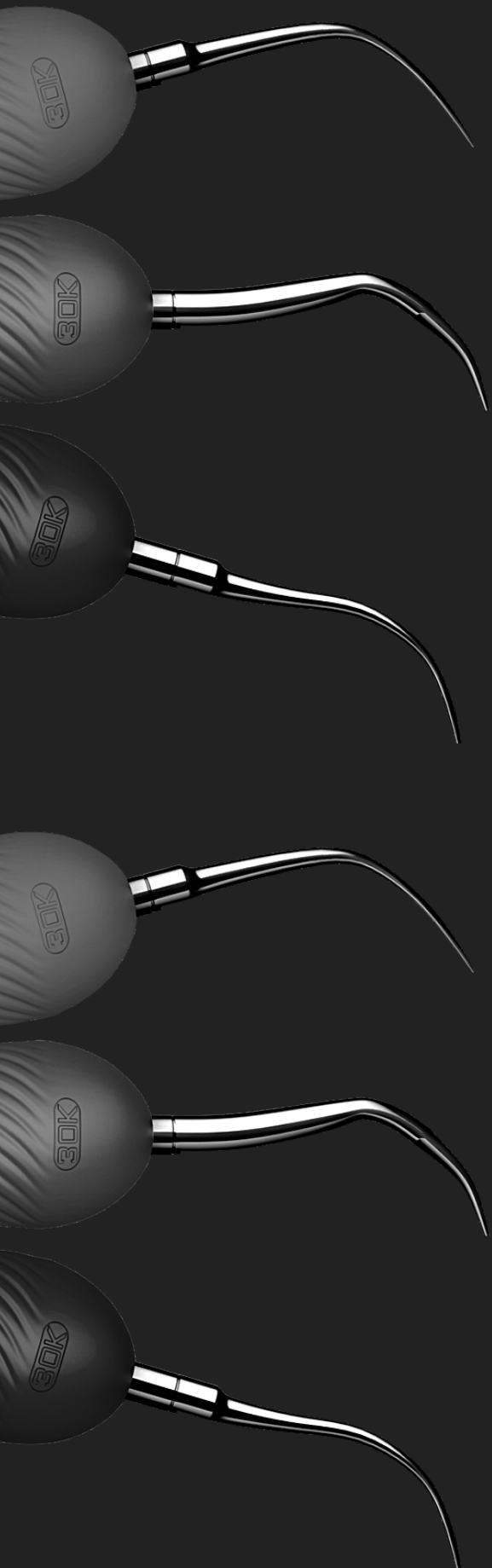
systemic health conditions

- **communicable disease**
aerosols can transmit disease
- **non - shielded / older model pacemakers**
there is potential for electromagnetic interference
(when in doubt, consult the patient's cardiologist)
- **predisposition to infection**
transmission of disease through water and aerosols is possible
- **patients prone to respiratory infections or have difficulty breathing**
aspiration of septic material or microorganisms is possible
- **patients who have difficulty swallowing or are prone to gagging**
choking or aspiration of water is possible

oral conditions

- **demineralized areas**
breakdown of tooth structure or remineralization layer may occur
- **exposed dentinal surfaces**
exposed dentinal tubules may lead to or increase sensitivity
- **primary dentition**
transmission of disease through water or aerosols is possible
- **restorations**
improper tip application can damage some restorations
 - PORCELAIN may remove the glaze and lead to pores
 - COMPOSITE may result in a roughened surface
 - AMALGAM may cause scratches, breakdown, or lead to pores
- **titanium implant abutments**
direct contact with metal ultrasonic tip can cause damage to implants
(research continues to support the use of plastic tips designed for implants when using the ultrasonic)





all about **INSERTS**

In order to maximize the full potential of ultrasonic scaling, the clinician should be able to identify insert TIP TYPES & SHAPES. Each type and design has a specific application for efficient and effective treatment.

TIP TYPE for ultrasonic scaling

standard / universal

- largest and widest in diameter
- moderate to heavy calculus

slim

- reduced in diameter (less than standard)
- biofilm & light to moderate calculus

thin

- narrowest in diameter (less than slim)
- biofilm & light to moderate calculus

implant tip

- plastic tip placed over metal tip
- designed for biofilm and light to moderate calculus

**** there are many additional tip types and the types vary depending on the manufacturer; this course focuses on a few general tip types*

TIP SHAPE for ultrasonic scaling

straight

curved (right, left)

complex design (two, three bends)

beavertail

The following resources are designed as SIMPLE & QUICK guides, applicable to most clinical practices. Each infographic was designed with a common ultrasonic manufacturer's products.

**** branding removed per ADA CERP guidelines*

APPLICATION of ultrasonic scaling

The application and effectiveness of ultrasonic scalers is highly dependent upon operator technique and application of the tip.

procedure process

- **flush the water tubing**
flush the water tubing 2 minutes at the start of the day and flush 30 seconds between patients
- **tip selection**
select the most appropriate tip based on...
 1. *deposit type present*
biofilm, light calculus, moderate calculus, heavy calculus
 2. *anatomy of the treatment site*
flat, contoured
 3. *gingival condition*
tight, loose, thick, thin
- **power setting**
select the appropriate power setting for the deposit level and adjust as often as needed
- **fluid adjustment**
select the appropriate lavage and adjust as often as needed, a light mist with no excessive dripping is recommended
- **grasp**
a light grasp is important to ensure that maximum efficiency is being met
- **fulcrum**
intraoral or extraoral may be used
- **lateral pressure and activation**
light lateral pressure is required for effective debridement and stroke, improving operator ergonomics and patient comfort
- **tip adaptation**
the terminal 2-3 mm should be adapted to the tooth during instrumentation and should align parallel to the tooth surface as close to 0 degrees but no more than 15 degrees
tip of the insert should never be placed directly on the tooth
- **instrument stroke**
short, overlapping, brush-like strokes should be utilized to ensure that the complete coverage of the tooth is happening



ULTRASONIC SCALING

10 - STEP

start up

preliminary set-up

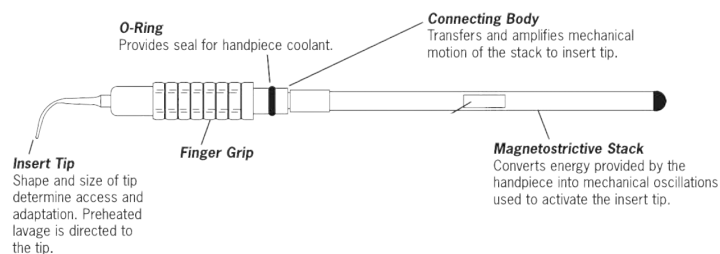
1. Turn on the dental control unit.
2. Set the power adjustment appropriately.
3. Attach the handpiece onto the connector cable.
4. Adjust the lavage control on the handpiece to maximum (fully clockwise).
5. Hold the handpiece over a sink or drain, activate foot control, and purge the water system for 2 minutes.

power & lavage flow

6. Lubricate the rubber o-ring on the insert with water before placing it into the hand-piece.
7. Fully seat insert into insert port, with a gentle push-twist motion. DO NOT FORCE.
8. Adjust the lavage control at the end of the handpiece for a moderate flow.

installation check

9. Verify operation by adjusting the power control between minimum and maximum on the machine and observe a change in the water spray.
10. Water flow through the handpiece is adjusted by rotating a control element on the cable connector (blue).



*** this self study RESOURCE does not have branding associated. However, the information above can easily be identified and applied to most ultrasonic devices.

ULTRASONIC SCALING

choosing the correct

MAGNETOSTRICTIVE INSERT

In ultrasonic instrumentation, each insert is uniquely designed for specific use. To select the most appropriate insert, you must first identify the deposit type present and the anatomy of the treatment site, then a power level can be selected.

beavertail

deposit: HEAVY CALCULUS / LEDGE
HEAVY EXTRINSIC STAIN

anatomy: FLAT or CONTOURED

power level: LOW to HIGH

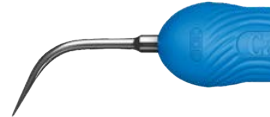


standard, straight

deposit: MODERATE to HEAVY CALCULUS

anatomy: FLAT or CONTOURED

power level: LOW to HIGH



standard, two bends

deposit: MODERATE to HEAVY CALCULUS

anatomy: FLAT or CONTOURED

power level: LOW to HIGH

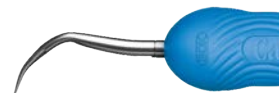


standard, three bends

deposit: MODERATE to HEAVY CALCULUS

anatomy: FLAT or CONTOURED

power level: LOW to HIGH



ULTRASONIC SCALING

choosing the correct

MAGNETOSTRICTIVE INSERT

In ultrasonic instrumentation, each insert is uniquely designed for specific use. To select the most appropriate insert, you must first identify the deposit type present and the anatomy of the treatment site, then a power level can be selected.

slim, left curve

deposit: ALL TYPES OF BIOFILM
LIGHT to MODERATE CALCULUS

anatomy: CONTOURED

power level: LOW to MEDIUM



slim, straight

deposit: ALL TYPES OF BIOFILM
LIGHT to MODERATE CALCULUS

anatomy: FLAT

power level: LOW to MEDIUM



slim, right curve

deposit: ALL TYPES OF BIOFILM
LIGHT to MODERATE CALCULUS

anatomy: CONTOURED

power level: LOW to MEDIUM



slim, three bends

deposit: ALL TYPES OF BIOFILM
LIGHT to MODERATE CALCULUS

anatomy: FLAT

power level: LOW to HIGH



ULTRASONIC SCALING

choosing the correct

MAGNETOSTRICTIVE INSERT

In ultrasonic instrumentation, each insert is uniquely designed for specific use. To select the most appropriate insert, you must first identify the deposit type present and the anatomy of the treatment site, then a power level can be selected.

THIN insert

deposit: ALL TYPES OF BIOFILM
LIGHT to MODERATE CALCULUS

anatomy: FLAT

power level: LOW to HIGH

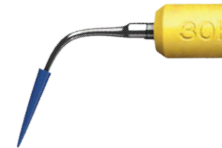


IMPLANT insert







deposit: ALL TYPES OF BIOFILM/
LIGHT to MODERATE CALCULUS

anatomy: FLAT

power level: LOW



INSERT DESIGN

Bends	Cross-Section	Thicker
 1000		FSI® PowerLINE™-1000 (FSI®-1000)
 100		FSI® PowerLINE™-100 (FSI®-100)
 10		FSI® PowerLINE™-10 (FSI®-10)

*** this self study RESOURCE does not have branding associated.
However, the inserts pictured above can easily be identified through
the following nonspecific names.

ULTRASONIC SCALING

troubleshooting

no vibration and/or no water...

- Ensure dental unit is turned on
- Ensure dental water line is attached and lavage controls are in order
- Verify handpiece is fully seated on cable connector
- Verify handpiece is not damaged; change if necessary
- Evaluate insert for wear or damage

low or intermittent vibration...

- Evaluate insert for wear or damage
- Ensure power level is set appropriately
- Ensure there is no air trapped in handpiece
- Change handpiece if necessary

'hot' handpiece, decreased lavage flow...

- Ensure dental water line is attached and lavage controls are in order
- Ensure handpiece is not damaged; change if necessary

CARE & MAINTENANCE of ultrasonic equipment

it is the responsibility of the clinician to ensure that the ultrasonic unit and insert tips are being maintained according to the manufacturer's recommendations.

Cleaning & Sterilization

proper cleaning and maintenance of the ultrasonic device should be regularly followed to ensure longevity. Prior to sterilization, tips should be rinsed thoroughly with water to remove any debris. The ultrasonic handpiece and tips must be sterilized after every use. Standard autoclave pouches are used for processing; autoclavable instruments cassettes may also be used.

O-Ring & Metal Stack

care of the ultrasonic handpiece includes lubrication of the O-ring prior to placing the insert tip in the handpiece. If the metal stack of a magnetostrictive insert is bent, it should be discarded and replaced.

Insert Tips

Monitoring the wear of the insert tip should be done frequently. A tip that exhibits 1 mm wear has lost approximately 25% efficiency. Once a tip has sustained 2 mm of wear, it should be replaced because the efficiency is reduced by 50%. Wear guides are provided by some manufacturers to assess tip wear properly.

Interchanging one manufacturer's inserts with a different manufacturer's inserts is not recommended



who, how & what

ULTRASONIC SCALING

WHO

does this information apply to?

ALL CLINICAL ROLES

The entire dental team can benefit from understanding the clinical applications and important properties of ultrasonic scaling.

HOW

does this information apply to you?

DENTISTS

You can encourage your clinicians by promoting the use of evidence-based equipment. Providing members of the dental team with up- to-date technology, as well as a variety of ultrasonic insert options can optimize overall production. Purchasing new equipment may be necessary to ensure that your team is working as efficiently as possible. Your support demonstrates your commitment to team-based leadership and excellent patient care.

DENTAL HYGIENISTS

You can apply your knowledge of ultrasonic scaling, effectively and efficiently, providing advanced care to each patient. You can educate your patients on the importance of utilizing ultrasonic scalers and help them to understand the associated benefits. By routinely checking the ultrasonic tips for wear, you can recommend replacement as needed while helping to ensure that the equipment is properly maintained.

DENTAL ASSISTANTS

You can use your knowledge of this topic to educate patients and identify any contraindications for ultrasonic use. In addition, you can monitoring the inserts for wear and identify when replacement tips are needed, while assisting with the overall maintenance / troubleshooting of the equipment.

WHAT

resources are available?

There are numerous resources available for supporting the use of ultrasonic scalers. The resources linked on this page include videos and powerpoints, some of which are created by manufacturers of ultrasonic equipment and leading dental hygiene companies.



resources

additional resources
available upon request

VIDEOS

by Dentsply Sirona
[CAVITRON INSERT PORTFOLIO](#) (21 minutes)
Using Cavitron Inserts
by Hygiene Edge
[Ultrasonic Tutorial](#)
[Prophylaxis Tips with the Ultrasonic](#)

POWERPOINTS

by Dentsply Sirona
[ULTRASONIC TECHNOLOGY](#)
Types of Power Scalers
[ULTRASONIC INSTRUMENTATION](#)
Infection Prevention & Insert Care

references

additional references
available upon request

Blue, CM. Darby's Comprehensive Review of Dental Hygiene 9th ed. St. Louis, Elsevier, 2022.

Boyd LA, Mallonee LF, Wyche CJ. Wilkins' Clinical Practice of the Dental Hygienist 13th ed. Burlington, MA, Jones & Bartlett Learning, 2021.

Henry RK, Goldie MP. Dental Hygiene: Applications to Clinical Practice. Philadelphia, F.A. Davis Company, 2016.

SMS

course

03

summer 2022

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RELEASE DATE
08.15.22

DEADLINE
to complete at no cost
09.16.22

instructions

- **READ the MATERIALS**
read and review the course materials
- **COMPLETE the TEST**
complete 15-questions / 12 must be correct to receive credit
- **SUBMIT your ANSWERS**
submit answers online at <http://go.osu.edu/smsce>
- **CERTIFICATE of COMPLETION**
certificate is emailed / check your email and junk/spam folders

questions

- **WHO can EARN FREE CE CREDITS?**
EVERY dental professional in your office
- **HOW MANY CE CREDITS are EARNED?**
two CE credits are issued for successful course completion ---
credits count toward OSDB 2022-2023 biennium totals
- **WHAT if I MISS THE DEADLINE?**
submit answers by deadline to receive credits at no charge
after deadline, course can be purchased until end of biennium
- **WHEN are SMS COURSES OFFERED?**
four times per year totaling EIGHT free CE credits
- **WHEN is the CERTIFICATE EMAILED?**
allow two weeks for processing/emailing of the certificate
- **WHAT is my SMS NUMBER?**
everyone in your office uses the same SMS number (office
account number) - number is on label on back of test envelope)

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ULTRASONIC SCALING

test questions

1. There are two categories of power scaling devices: sonic scalers & ultrasonic scalers.
 - a. true
 - b. false
2. Magnetostrictive scalers have tips capable of being _____ that generate a/an _____ tip motion.
 - a. removable ; elliptical
 - b. magnetized ; elliptical
 - c. removable ; linear
 - d. magnetized ; linear
3. The elliptical motion of a magnetostrictive unit activates ALL sides of the working tip. Magnetostrictive inserts produce little heat, minimizing the amount of water needed.
 - a. both statements are true
 - b. both statements are false
 - c. the first statement is true, the second statement is false
 - d. the first statement is false, the second statement is true
4. All of the following are advantages of ultrasonic scaling except:
 - a. conservation of root surface
 - b. mechanical removal of biofilm and calculus
 - c. greater effectiveness over manual instrumentation
 - d. acoustic streaming
5. _____ is the rapid movement of air bubbles out of the tip of the insert leading to the creation of shock waves.
 - a. acoustic streaming
 - b. lavage
 - c. cavitation
 - d. acoustic turbulence
6. An advantage of using ultrasonic scalers is potential for improved operator ergonomics. Power scaling devices require less lateral pressure for effective debridement and stroke.
 - a. both statements are true
 - b. both statements are false
 - c. the first statement is true, the second statement is false
 - d. the first statement is false, the second statement is true
7. Which statement is incorrect?
 - a. light lateral pressure is required for effective debridement and stroke
 - b. light grasp is important to ensure that maximum efficiency is being met
 - c. the terminal 2-3mm should be adapted to the tooth during instrumentation
 - d. the end/point of the tip should be placed directly on the tooth to effectively remove debris
8. It is important to use short, overlapping, brush-like strokes to ensure complete coverage of the surface area being scaled.
 - a. true
 - b. false
9. When adapting the tip of the instrument, it should align parallel to the tooth surface, as close to 0 degrees, but no more than 15 degrees.
 - a. true
 - b. false
10. The use of ultrasonic instrumentation is contraindicated in which of the following situations?
 - a. patients with respiratory risk
 - b. non-shielded / older model pace makers
 - c. patients with predisposition to infection
 - d. patient who have trouble swallowing, prone to gagging
 - e. all of the above
11. Which of the following should be considered when selecting the most appropriate ultrasonic insert?
 - a. deposit type
 - b. gingival condition
 - c. root surface anatomy
 - d. all of the above
12. Monitoring the wear of the insert tip should be done frequently. When a tip has sustained ____ mm of wear, it should be replaced because efficacy is reduced by ____ %.
 - a. 2 ; 25
 - b. 2 ; 50
 - c. 3 ; 25
 - d. 3 ; 50
13. The clinician should lubricate the O - ring on the insert, prior to placing it in the handpiece.
 - a. true
 - b. false
14. Which statement is incorrect?
 - a. standard diameter tips are designed for moderate to heavy calculus
 - b. slim diameter tips are designed for light to moderate calculus and biofilm
 - c. thin diameter tips are designed for light to moderate calculus and biofilm
 - d. the beavertail design is recommended for removal of light calculus
15. Which statement is incorrect?
 - a. all clinical staff should be able to identify and differentiate each ultrasonic scaling insert and tip
 - b. it is the responsibility of the clinician to ensure that ultrasonic machines and instruments are being maintained to manufacturer's recommendations
 - c. interchanging manufacturer inserts with a different manufacturer's inserts is recommended
 - d. If the metal stack of a magnetostrictive insert is bent, it should be discarded and replaced
 - e. cleaning and maintenance of the ultrasonic device should be regularly followed to ensure longevity



deadline is 9.16.22
<http://go.osu.edu/smsce>