PRINCIPLES OF POWER-DRIVEN INSTRUMENTATION

• Ultrasonic/sonic and hand instrumentation are both utilized in initial and supportive periodontal therapy
• Clinical studies have shown results (periodontal tissue health) to be the same following ultrasonic/sonic or hand instrumentation
• The goal of both hand instrumentation and ultrasonic/sonic instrumentation is debridement to a state of periodontal health.
RESEARCH

KEY CONCEPT

• A COMBINATION OF HAND INSTRUMENTATION AND MECHANIZED INSTRUMENTATION IS PROBABLY MOST EFFECTIVE CLINICALLY AND IN TERMS OF TIME MANAGEMENT.
3 TYPES OF POWER INSTRUMENTATION

- MAGNETORESTRICTIVE ULTRASONIC
- PIEZOELECTRIC ULTRASONIC
- SONIC INSTRUMENTATION
Sonic Scalers

- Air driven turbine-high speed line
- 6-9,000 cps
- Tip rotates with circular tapping motion—all sides of tip effective
- Noisy
- Minimal heat generated-needs water
- Inexpensive ($600-800)
- Portable
- **Titan, Densonics, KaVo**
Sonic Scalers

Dental EZ-Titan

KaVo

Implant tip
Piezoelectric Scaler
Piezoelectric Scalers

• Crystal quartz converts electrical energy into mechanical vibrations.
• 20,000-45,000 cps.
• Linear tip movement-sides only effective.
• Light and quiet.
• Generates heat-needs water.
• Most expensive of all the mechanical scalers.
Magnetostrictive Scaler

Magnetostrictive scalers are used in the U of MN Dental clinics
Magnetostrictive Scalers

- Magnetized metal stacks convert electrical impulses into mechanical vibrations.
- 20,000-45,000 cps.
- Elliptical motion—all sides of tip effective.
- Generates the most heat—water is critical to degree of cooling.
Magnetostrictive power dispersion to tip

POWER DISPERSION

most powerful
#1 point of tip
#2 concave surface
#3 convex surface
#4 lateral surfaces

least powerful

#1 point
#2 concave
#3 convex
#4 lateral side
From the Leaders in Ultrasonic Scalers and Inserts

INTRODUCING
Cavitron® SofTip™ Ultrasonic Implant Insert

Easily incorporate the Cavitron® SofTip™ Ultrasonic Implant Insert into your implant maintenance procedure. Save time with the convenience of a Cavitron® SofTip™ Ultrasonic Implant Insert*

- Removes plaque and calculus around titanium implants and abutments
- Benefit of ultrasonic lavage delivery during implant maintenance
- Compatible with 30 kHz Cavitron® ultrasonic scalers

Contraindications:
- The Cavitron® SofTip™ Ultrasonic Implant Insert is only to be used with a SofTip™ Disposable Prophy Tip installed and only designed for use with Cavitron® Ultrasonic Scalers at a LOW power setting (BlueZone™)
- Cavitron® SofTip™ Ultrasonic Implant Insert and SofTip™ Disposable Prophy Tips are not designed for primary, hard calculus removal during routine prophylaxis
- SofTip™ disposable Prophy Tips are not radiopaque. Please observe all warnings and carefully follow directions for use to prevent tip breakage
Tip Oscillation Patterns

- Sonic scaler: 60–1000 μm
- Piezoelectric ultrasonic scaler: 13–72 μm
- Magnetostrictive ultrasonic scaler: 13–72 μm

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ULTRASONIC TERMINOLOGY
POWER

- POWER refers to the electrical energy in the handpiece used to generate insert movement.
- The “Power” knob adjusts the stroke.
- Stroke is the distance the insert moves during one cycle.
- Amplitude is equal to one half the stroke.
- Lower amplitude/stroke/power is generally more comfortable for the patient.
FREQUENCY

• FREQUENCY IS THE NUMBER OF TIMES PER SECOND THE INSERT TIP MOVES BACK AND FORTH DURING A CYCLE.

• A CYCLE IS ONE COMPLETE LINEAR, CIRCULAR OR ELLIPTICAL STROKE PATH.

• FREQUENCY IS SET AT THE MANUFACTURER
“Water” Terminology

- **LAVAGE** refers to flushing of the sulcus; disruption of plaque biofilm, and removal of necrotic tissue and blood
- **CAVITATION** refers to the formation of bubbles in oral liquids/creation of shock waves in fluids
- **ACOUSTIC STREAMING** refers to fluid movement caused by ultrasonic waves
ADVANTAGES OF POWER INSTRUMENTATION

• Increased efficiency
• No need to sharpen
• Less chance of repetitive strain injuries
• Reduced lateral pressure required
• Water lavage and irrigation
• Biofilm disruption
Biofilms consist of mushroom-shaped bacterial colonies in which incompatible species of bacteria cooperate to thrive in a hostile environment. Channels act as alimentary canals.
DISADVANTAGES OF POWER INSTRUMENTATION

- More precautions and limitations
- Client comfort - sound and water
- Aerosol production
- Less tactile sensation
- Reduced visibility
PRECAUTIONS

- Pacemakers- newer models are insulated and bipolar - electromagnetic interference is unlikely
- Communicable diseases - hepatitis, tuberculosis, strep throat and respiratory infections - transmission via aerosols is possible
- Demineralized tooth structure, hypersensitive areas, veneers, cast crowns and implants… ultrasonic instrumentation may irritate
- Children - primary and newly erupted teeth have larger pulp areas - more susceptibility to heat
- Immunosuppression - creation of aerosols may increase patient risk for infection
CONTRAINDICATIONS

• Chronic pulmonary disease - aspiration of MOs in biofilm
• Cardiovascular disease with secondary pulmonary disease - aspiration of biofilm MOs into lungs
• Dysphagia or swallowing difficulty with water flow
AEROSOL PRODUCTION

• No studies link aerosols from dental instrumentation to disease transmission
• Aerosol - fine, airborne particles (liquids and solids) less than 50um in size - likely to be airborne and be aspirated or inhaled by the patient
• Spatter - particles greater than 50 um in size that can be found on surfaces, masks and gowns.
• Droplet nuclei - Mycobacterium tuberculosis - may penetrate the mask
• Large and small particles may contain HIV or HBV
• Always use appropriate universal precautions
Antimicrobial Pre-Rinse

• Chlorhexidine (Rx) or Listerine rinse
• One - two minute “swishing” with an antimicrobial rinse prior to ultrasonic debridement
• A one - two minute rinse with an antimicrobial rinse will significantly reduce the bacterial count in a dental aerosol
SATIN SWIVEL™ DESIGNS

Revolutionary SWIVEL™ feature for smooth scaling from arch to arch or tooth to tooth

Experience the maneuverability and adaptability you want in power scaling with the exclusive SATIN SWIVEL™ inserts. With a slight rolling motion of your fingertips, you can eliminate the old “start, stop, remove and readjust” routine required with traditional inserts. SATIN SWIVEL™ inserts also reduce the torque from the handpiece cord, increasing overall balance for hassle-free scaling.

The grip—up to 26% larger than most standard inserts—reduces finger pinching, resulting in less hand fatigue* and enhanced tactile sensitivity. The lightly textured silicone grips are color-coded for easy tip identification and provide a secure, comfortable grasp.

25kHz Part Code
UI25SS10
UI30SS10

30kHz Part Code
UI25SS100
UI30SS100

#10 Universal
#100 Thin
#1000 Triple Bend

Roll the insert in your fingertips for easier and more efficient scaling.
Insert selection

• Focus Spray-internal water
  – Slimline
  – Straight, right and left curves
  – Used subgingivally for all deposits
  – Lower power
Universal straight thick tip
- ledges of supra calculus
- heavy and moderate subgingival deposits
Universal straight thin tip

- shallow pockets
- narrow deep pockets
- explore for deposits
Tip Wear

Tip wear is critical to efficiency of the instruments. One mm loss on tip (blue line) equates to 25% loss of efficiency and two mm loss on tip (red line) equates to 50% loss in efficiency (throw out).
ULTRASONIC STRATEGY

• Where is the disease?
• What type of deposit is present?
• How accessible are the deposits?
• What are contraindications for use?
• What are the barriers for access?
• What is your time frame?
Ultrasonic Set-Up

• Attach handle or sheath
• Step on rheostat to bring water bubble to top of sheath opening
• Flush water line for 2 minutes at the beginning of the day (30 seconds between patients)
• Push ultrasonic insert into the handle/sheath
• Adjust water and power levels
Clinical Debridement Procedure

- Antimicrobial rinse - Peridex (Chlorhexidine gluconate 0.12% oral rinse) or Listerine
- Sonic/ultrasonic (60-70% time)
- Hand scalers (20-30% time)
- Sonic/ultrasonic (final 10% time)
- Selective polishing
- Flossing
- Oral Hygiene Instructions
- Antimicrobial rinse
WORKING TIPS

• Use probing depths and radiographs as guides for ultrasonic activation
• Use “Painting” strokes/Tapping Strokes for large deposits
• Keep insert moving at all times
• Use light lateral pressure
• Work from coronal areas apically to root surfaces
• Control water - Use saliva ejector or HVE to control aerosols
• Desensitizing agents are available for soft tissue and dentin comfort
Working Stroke Multi-directional

Vertical Strokes

Horizontal Strokes

Oblique Strokes

Thoroughly cover all of the tooth surfaces
Position of Tip

Always keep tip moving to prevent soft tissue damage
Cleaning Actions

Hand instrumentation vs. power-driven instrumentation
Working Strokes
Adaptation to Tooth Morphology
**OBLIQUE**

- Similar to bladed instrument
- Recommended for supragingival & interproximal instrumentation
- May limit access to depth of pocket

**VERTICAL**

- Similar to periodontal probe
- Recommended for subgingival instrumentation; may also be used supragingivally
- Maximizes access to depth of pocket
POSTERIOR SEQUENCE
ULTRASONIC ADAPTATION
Fig. 5
CURVED INSERTS/
FURCATION ADAPTATION
Straight Slim (Perio) Insert/Tip

Curved Slim (Perio) Insert/Tip
ANTERIOR SEQUENCE
ULTRASONIC ADAPTATION
Systematic approach to use

Use of “offset angulated” tips
REFERENCES

• Dental Hygiene Theory and Practice, Darby and Walsh. 3rd Edition

• DENTSPLY Professional Teaching Institute 2009.