Making the Most of the 20th Annual Conference and Exhibition:

A Practical Orientation for Attendees

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Academy of Laser Dentistry
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Palm Springs, California

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Checklist for Evaluating Lasers

A. Determine Your Specific Clinical Needs
   1. Experience
   2. Preferences

B. Clinical Applications of Specific Device
   1. Regulatory Marketing Clearances
   2. Range of Applications
   3. Speed of Performance
   4. Precision and Controllability

C. Design
   1. Specifically Designed for Intraoral use?
   2. Operational Noise Level

D. Limitations
   1. Electrical Power Requirements
   2. External Cooling System Requirements
   3. Inadvertent Interaction with Infrared-Controlled Office Devices

E. Safety
   1. Built-In Features
   2. Adjunct Measures Necessary for Safe Performance
   3. Concerns, including:
      a. Is it possible to defeat the safety interlock?
      b. Is it possible to activate the laser at zero power setting?
      c. Is the laser adequately protected from spills?

F. Sterilization and Disinfection
   1. Instrument
   2. Delivery System

G. Device-Specific Supporting Research
   1. Scientifically Rigorous?
   2. Peer-Reviewed?

H. Device-Specific Training
   1. Adequacy
   2. Convenience
   3. Frequency
   4. Cost
   5. Credentials and Disclosures
   6. Ongoing Support

I. Documentation – Organization, Illustrations, Comprehensiveness, Ease of Use, Troubleshooting
   1. Operator Manual
   2. Clinical Applications Manual

J. Ergonomics
   1. Ease of Set-Up
   2. Ease of Use
   3. Control Panel
   4. Visibility of Displays
   5. Activation Force of Foot Pedal

K. Portability
   1. Size
   2. Weight
   3. Maneuverability
   4. Storage of Accessories

The Institute for Advanced Dental Technologies – January 2013
Checklist for Evaluating Lasers

L. Controllability
   1. Power
   2. Pulse Frequency
   3. Pulse Width
   4. Timer for Duration of Exposure

M. Features
   1. Appropriateness for Dentistry
   2. Output Power
   3. Aiming Beam
      a. Available?
      b. Attenuated by Safety Glasses?
      c. Type?
      d. Controllable?
   4. Plume-Clearing Gas for Delivery System Optics and Waveguides
   5. Evacuation
   6. Emission Indicators
      a. Visual
      b. Audible
   7. Delivery System
      a. Flexibility
      b. Reach
      c. Efficiency in Energy Transmission
      d. Maintenance and Accessibility for Cleaning
      e. Damageability
      f. Storage and Fit Through Doorways
      g. Counterbalance
      h. Ease of Adjustment
      i. Ease of Mirror Alignment (If Articulating Arm)
      k. Cooling
   8. Built-In Printer for Treatment Record
   9. Video Compatibility

N. Accessories
   1. Safety Eyewear
   2. Optic Fibers
   3. Waveguides
   4. Handpieces
   5. Micromanipulators
   6. Focusing Lenses
   7. Disposable Tips
   8. Interchangeable Connectors
   9. Fiber Stripers
   10. Fiber Cleavers
   11. Fiber Inspection Microscope
   12. Laser Safety Signs
Checklist for Evaluating Lasers

O. Delivery System Components
   1. Longevity
   2. Autoclaveable
   3. Ease of Use
   4. Ease of Change
   5. Disposable
   6. Cost

P. Quality of Construction
   1. Ruggedness
   2. Beam Alignment
   3. Calibration

Q. Reliability

R. Service
   1. Factory
   2. On-site
   3. Packaging
      a. Durability
      b. Re-Usable?
      c. Cost
      d. Ease of Repacking

S. Cost
   1. Initial
   2. Maintenance
   3. Replacement Parts

T. Upgradeability

U. Warranty
   1. Duration
   2. Parts
   3. Labor
   4. Shipping

V. Track Record
   1. Number of Installations
   2. Availability for Follow-Up
   3. Performance
   4. Safety
      a. Incident Report History and Policy
   5. Service
      a. Response Time
      b. Hours of Operation
      c. Reliability of Repair
      d. Loaner Policy
   6. Parts and Accessories
      a. Available When Needed
      b. Delivery
      c. Ease of Ordering (Telephone, Fax, Online)
      d. Warranty
   7. Customer Satisfaction
   8. Repeat Customers
Critically Evaluating the Dental Literature and Health Information on the Internet

Suggested Resources


10. CEBD. Centre for Evidence-Based Dentistry. Available at: http://www.cebd.org/

The preceding Web sites were accessed on January 27, 2013.
U.S. FDA Marketing Clearances
by Indication for Use
(Applies to Certain Models Only)

Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)
- Carbon Dioxide
- Nd:YAG
- Argon
- Ho:YAG
- Er:YAG
- Nd:YAP
- Er:YSGG
- Diode
- Frequency-Doubled Nd:YAG
- Diode-Pumped 2.01-micron

Curing of Composite Materials
- Argon

Aphthous Ulcer Treatment
- Er,Cr:YSGG
- Carbon Dioxide
- Nd:YAG
- Diode
- Er:YAG
- Frequency-Doubled Nd:YAG

Tooth Whitening
- Carbon Dioxide
- Argon
- Diode
- Frequency-Doubled Nd:YAG

Sulcular Debridement
- Nd:YAG
- Diode
- Er:YAG
- Er:YSGG
- Carbon Dioxide

Caries Removal, Cavity Preparation, Enamel Roughening
- Er:YAG
- Er:YSGG

Illumination for Caries Detection
- Argon

Illumination for Endodontic Orifice Location
- Argon

Soften Gutta Percha
- Argon
- Frequency-Doubled Nd:YAG

Removal of Coronal Pulp, Adjunct to Root Canal Procedures
- Nd:YAG
- Diode
U.S. FDA Marketing Clearances
by Indication for Use
(Appplies to Certain Models Only)

Pulpotomy as Adjunct to Root Canal Procedures
• Diode
• Nd:YAP
• Nd:YAG
• Er,Cr:YSGG
• Er:YAG

Selective Removal of Enamel (First Degree) Caries
• Nd:YAG

Removal of Filling Materials as Adjunctive Treatment during Root Canal Retreatment
• Nd:YAP
• Nd:YAG

Aid in Diagnosis of Dental Caries
• Diode

Treatment of Herpetic Lesions
• Er,Cr:YSGG
• Nd:YAG
• Frequency-Doubled Nd:YAG
• Diode
• Er:YAG

Blood Flow Measurements
• Diode

Tooth Preparation to Obtain Access to Root Canal, Pulp Extirpation, Root Canal Debridement and Cleaning, Root Canal Preparation including Enlargement
• Er,Cr:YSGG
• Er:YAG

Cutting, Shaving, Contouring and Resection of Oral Osseous Tissues (Bone)
• Er,Cr:YSGG
• Er:YAG

Apicoectomy Surgery
• Er,Cr:YSGG
• Er:YAG

Coagulation of Extraction Sites
• Diode
• Carbon Dioxide

Osteotomy, Osseous Crown Lengthening, Osteoplasty
• Er,Cr:YSGG
• Er:YAG

Laser-Assisted New Attachment Procedure (cementum-mediated periodontal ligament new-attachment to the root surface in the absence of long junctional epithelium)
• Nd:YAG
• Carbon Dioxide

Reduction of Bacterial Level (Decontamination) and Inflammation
• Diode
U.S. FDA Marketing Clearances
by Indication for Use
(Applies to Certain Models Only)

Aid in Detection and Localization of Subgingival Dental Calculus
- Diode

Root Canal Disinfection after Endodontic Instrumentation
- Er, Cr:YSGG

Removal of Subgingival Calculi in Periodontal Pockets
- Er:YAG
- Er, Cr:YSGG

Removal of Highly Inflamed Edematous Tissue Affected by Bacterial Penetration of the Pocket Lining and Junctional Epithelium
- Diode
- Er, Cr:YSGG

Removal of Pathological Tissues (i.e., Cysts, Neoplasm or Abscess) and Hyperplastic Tissues (i.e., Granulation Tissue) from around the Apex
- Er, Cr:YSGG
- Er:YAG
U.S. FDA Marketing Clearances
by Wavelength
(Appplies to Certain Models Only)

Carbon Dioxide

• Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)
• Aphthous Ulcer Treatment
• Tooth Whitening
• Sulcular Debridement
• Coagulation of Extraction Sites
• Laser-Assisted New Attachment Procedure (cementum-mediated periodontal ligament new-attachment to the root surface in the absence of long junctional epithelium)

Nd:YAG

• Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)
• Aphthous Ulcer Treatment
• Sulcular Debridement
• Removal of Coronal Pulp, Adjunct to Root Canal Procedures
• Selective Removal of Enamel (First Degree) Caries
• Pulpotomy as Adjunct to Root Canal Retreatment
• Removal of Filling Materials as Adjunctive Treatment During Root Canal Retreatment
• Treatment of Herpetic Lesions
• Laser-Assisted New Attachment Procedure (cementum-mediated periodontal ligament new-attachment to the root surface in the absence of long junctional epithelium)

Argon

• Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)
• Curing of Composite Materials
• Tooth Whitening
• Illumination for Caries Detection
• Illumination for Endodontic Orifice Location
• Soften Gutta Percha

Ho:YAG

• Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)

Er:YAG

• Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)
• Caries Removal, Cavity Preparation, Enamel Roughening
• Aphthous Ulcer Treatment
• Sulcular Debridement
• Pulpotomy as Adjunct to Root Canal Retreatment
• Tooth Preparation to Obtain Access to Root Canal, Pulp Extermination, Root Canal Debridement and Cleaning, Root Canal Preparation including Enlargement
• Cutting, Shaving, Contouring and Resection of Oral Osseous Tissue (Bone)
• Treatment of Herpetic Lesions
• Apicoectomy Surgery
• Osteotomy, Osseous Crown Lengthening, Osteoplasty
• Removal of Subgingival Calculi in Periodontal Pockets
• Removal of Pathological Tissues (i.e., Cysts, Neoplasm or Abscess) and Hyperplastic Tissues (i.e., Granulation Tissue) from around the Apex
U.S. FDA Marketing Clearances
by Wavelength
(Appplies to Certain Models Only)

Er, Cr:YSGG
- Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)
- Aphthous Ulcer Treatment
- Cavity Preparation, Caries Removal, Tooth Etching
- Sulcular Debridement
- Treatment of Herpetic Lesions
- Pulpotomy as Adjunct to Root Canal Retreatment
- Tooth Preparation to Obtain Access to Root Canal, Pulp Extirpation, Root Canal Debridement and Cleaning, Root Canal Preparation including Enlargement
- Cutting, Shaping, Contouring and Resection of Oral Osseous Tissues (Bone)
- Apicoectomy Surgery
- Osteotomy, Osseous Crown Lengthening, Osteoplasty
- Root Canal Disinfection after Endodontic Instrumentation
- Removal of Highly Inflamed Edematous Tissue Affected by Bacteria Penetration of the Pocket Lining and Junctional Epithelium
- Removal of Pathological Tissues (i.e., Cysts, Neoplasm or Abscess) and Hyperplastic Tissues (i.e., Granulation Tissue) from around the Apex
- Removal of Subgingival Calculi in Periodontal Pockets

Diode
- Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)
- Aphthous Ulcer Treatment
- Sulcular Debridement
- Removal of Coronal Pulp, Adjunct to Root Canal Procedures
- Pulpotomy as Adjunct to Root Canal Retreatment
- Tooth Whitening
- Aid in Diagnosis of Dental Caries
- Blood Flow Measurements
- Treatment of Herpetic Lesions
- Coagulation of Extraction Sites
- Reduction of Bacterial Level (Decontamination) and Inflammation
- Aid in Detection and Localization of Subgingival Dental Calculus
- Removal of Highly Inflamed Edematous Tissue Affected by Bacteria Penetration of the Pocket Lining and Junctional Epithelium

Nd:YAP
- Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)
- Pulpotomy as Adjunct to Root Canal Retreatment
- Removal of Filling Materials as Adjunctive Treatment During Root Canal Retreatment

Frequency-Doubled Nd:YAG
- Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)
- Tooth Whitening
- Aphthous Ulcer Treatment
- Treatment of Herpetic Lesions
- Soften Gutta Percha

Diode-Pumped 2.01-micron
- Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)
Selected U.S. FDA Marketing Clearances
Lasers for Intraoral Use by Company and Device
May 1990 – December 20, 2012

This list generally designates laser instruments cleared by the U.S. FDA for intraoral use and generally available in the United States between May 1990 and December 20, 2012. It therefore is not intended to be comprehensive. Some devices are no longer marketed. Some are designed specifically for dentistry, while others are medical lasers with some intraoral applications. Information is accurate at date of compilation based upon available resources including www.fda.gov. Substantiated additions and revisions are respectfully solicited. Interested parties are advised to consider the clinical, risk, legal/regulatory, and ethical issues related to off-label use of medical devices.

Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating)

- Nd:YAG
  - Sunrise Technologies – dLase 300, 8 Watt Pulsed Dental Laser, Upgraded Package for dLase 300
  - Pfizer Laser Systems – Pegasus
  - Laser Endo Technic – Laser 35, Laser 6, Laser 12
  - Excel Technologies – Excel DuoPulse
  - Incisive Technologies – PulseMasters, dLase 300 Upgrade
  - Sciton – Contour Profile
  - Incisive LLC – InPulse, PinPointe FootLaser
  - Millennium Dental Technologies – PerioLase
  - Lares Research – SunLase 800 P (PocketPro)
  - Fotona – Fidelis Plus, Fidelis III, Fotona XP, LightWalker, Dynamis
  - Cynosure – Smart File Laser
  - Quanta System – Ultrawave III EX 1320
  - PathoLase – PinPointe and PinPointe FootLaser
  - PinPointe USA – PinPointe FootLaser

- Carbon Dioxide
  - NIIC USA – NIIC Laser System
  - Satelec – Lasersat CO₂
  - Luxar – Model LX-20 CO₂ Laser
  - Ion Laser Technology – ILT CO₂ Surgical Laser
  - Jamar Medical Systems – Chrys XX CO₂ Surgical Laser System
  - Clinicon Corporation – C4 CO₂ Laser, C-LAS, SureLase
  - Medical Laser Technologies – MLT 30 CO₂ Laser
  - OpusDent – Opus 20, Spectrum, OpusDuo EC
  - Lumenis – UltraPulse Encore
  - Lumenis – UltraPulse SurgiTouch
  - Cynosure – Smart CO₂, Smart US 20 D, UltraSpeed, Smart Clinic, Affirm CO₂ and Affirm CO₂ HP
  - PhotoMedex – LaserPro CO₂
  - Diamond Age Systems – Azuryt Model CTL 1401
  - Lumenis – OpusDent Family
  - MAX Engineering – Spectra-SP
  - Asclepion Laser Technologies – MultiStar
  - Lasering – SLIM Evolution Family, SLIM Evolution II
  - El.En. Electronic Engineering – SmartXide, Smart US20D, Smartxide 50 HS/MS
  - Alma – ThermoXEL, Pixel CO₂
  - Lumenis – AcuPulse 30 and 40, AcuPulse 30/40ST and 40WG
  - Advanced Technology Laser – ATL-150, ATL-250, eBeam
  - LaserOptek – Lotus II
  - OmniGuide – OmniGuide BeamPath FELS 25A
  - Lutronic – DENTA III, DENTA III+
  - Beijing Syntech Laser – Trioxel, Trioxel II
  - Quanta System – YOU LASER
  - LightScalpel – LightScalpel LS-10
  - Yoshida Dental Mfg. Co. – OPELASER PRO II and OPELASER Lite II

- Argon
  - HGM Medical Systems – Argon Ion Lasers
Selected U.S. FDA Marketing Clearances
Lasers for Intraoral Use
by Company and Device (continued)
May 1990 – December 20, 2012

Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating) (continued)

- Ho:YAG
  - Excel Technologies – Excel DuoPulse
- Er:YAG
  - Pfizer Laser Systems – Centauri YAG Laser
  - Continuum Electro-Optics – Multilite
  - Laserscope – Laserscope Erbium Laser
  - Xintec – Protégé, Protégé LP, Protégé II
  - KaVo America – KEY Laser 1242, KEY Laser 1242, 1243+
  - Fotona – Fidelis, Dualis Laser System, Fidelis III, LightWalker, Dynamis
  - Innotech USA – Friendly Light
  - Sciton – Contour Profile, Profile 3000
  - American Dental Technologies – PulseMaster Erbium
  - Asclepion-Meditec – Dermastar
  - OpusDent – OpusDuo EC
  - Cell Robotics – Ultra-Light Laser System
  - International Biophysics – Laser Peel System
  - Cynosure – Smart 2940D
  - HOYA ConBio – VersaWave
  - Cynosure – MCL 30 Dermablate
  - Lumenis – OpusDent Family
  - MSq(M²) – Lovely II and Lovely III
  - WaveLight Laser Technologie – Burane XL, Burane
  - Light Instruments – LiteTouch, LiteDuo
  - Alma Lasers – Harmony XL
  - Global USA Distribution – LaserPeel Soft-MET Modified Erbium Laser
  - Asclepion Laser Technologies – Dermablate Effect
  - J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A
- Nd:YAP
  - Lokki – Lokki DT
- Er,Cr:YSGG
- Diode
  - Premier Laser Systems – Aurora Surgical Diode Laser, Aurora HL Diode Laser System
  - American Dental Technologies – PulseMaster 1000 ST DioLase ST
  - CeramOptec – Cerelas Diode Model D15, Cerelas Diode Model D10
  - Dentek-Lasersystems – Dentek LD-15 Dental Laser
  - BioLase Technology – Twilight Dental Diode Laser
  - OpusDent – Opus 10
  - Continuum Electro-Optics – DioDent Dental Laser System
  - American Dental Technologies – DioLase 980 D
  - BioLase Technology – LaserSmile, EZLase, ezlase 10W, iLase, EPIC 10
  - MSq(M²) – Dio-Dent 10
  - Biolitec – Ceralas D810, Ceralas D980, Ceralas D100, Ceralas D150, Ceralas D15, Ceralas D25, Ceralas E 980 (E15/980, E30/980), 50W Ceralas D 1950, 180W Ceralas D 980 (D180), Ceralas Multiwavelength 980/1470 nm Diode Laser System, Ceralas D50, Ceralas D120, Ceralas D180, Evolve HPD 980, Evolve 980/1470 nm Multiwavelength Diode Laser (Evolve Dual)
  - HOYA ConBio – LVI Lase, DioLase II
  - PhotoMedex – LaserPro 810, 940 and 980
Selected U.S. FDA Marketing Clearances
Lasers for Intraoral Use
by Company and Device (continued)
May 1990 – December 20, 2012

Intraoral Soft Tissue Surgery (Ablating, Incising, Excising, Coagulating) (continued)

- Diode (continued)
  - Ivoclar Vivadent – Odyssey 2.4G
  - Diomed – Delta 15, Delta 30
  - Sirona Dental Systems – SIROLaser, SIROLaser Advance
  - Vision Lasertechnik – MDL-10/15
  - Asclepion Laser Technologies – QuadroStar 980, Orion
  - ProSurg – LaserTx
  - Xintec – Vectra
  - INTERmedic Arfran – INTERmedic, INTERmedic Diode Laser 980 nm System
  - Spectrum International – Prometey
  - B&W Tek – BWF-5
  - Lasering – Velure S9/7D, Velure S9/15D
  - Elexion – Claros Dental Laser System, Claros Nano
  - Ivoclar Vivadent – Odyssey Navigator
  - Quanta System – Diode Medical Laser Family (808, 940, 980 nm), Polysurge Diode Laser Family (808, 940, 980, 1064)
  - KaVo America – GENTLERay 980
  - A.R.C. Laser – Fox Q-810, Q-980, Q-1064
  - Valam – Fox 940
  - Light Instruments – LiteDuo
  - OroScience – Curative 980
  - Fotona – XD Diode Laser
  - AMD Lasers – Picasso, Picasso Lite, Picasso Perio
  - Lambda Scientifica – Doctor Smile A-810, B-980
  - QuickLase – QuickLase DUAL+, 810, 980 Dental Lasers
  - Light Instruments – D-STORM
  - LiteCure – BWF-5 Medical Laser Series (810, 930, 980, 1080, 1320 nm)
  - Eufoton – Lasemar 800, 1000, 1500
  - Focus Medical – NaturaLase 980
  - China Daheng Group – DenLase-810/7, DenLase-980/7, PenLase
  - Dental Photonics – stLase
  - Lambda – Doctor Diode (810, 940, 980, 1064 nm)
  - Discus Dental – SL3
  - Den-Mat Holdings – Sapphire ST, Sapphire Plus STM
  - MedArt, Medart 720
- Frequency-Doubled Nd:YAG
  - Fisma – Corium 200, Corium 400
  - Lumenis – Novus Spectra
  - Cynosure – SmartLite D
- Diode-Pumped 2.01-micron
  - AllMed Systems – RevoLix, RevoLix Jr.

Curing of Composite Materials

- Argon
  - HGM Medical Laser Systems – HGM Argon Ion Laser
  - ILT Systems – ACL-5500, CL-5500, Argon HP
  - LaserMed – AccuCure 3000, AccuCure 1000, Pulstar
  - Premier Laser Systems – Argon Curing Laser, Arago II
  - Fisma – Dental 200, Dental 300, Dental 400
Tooth Whitening

- Carbon Dioxide
  - ILT Systems – ILT Genesis 2000
  - Sharpplan Lasers – Model 15F CO₂ Laser
- Argon
  - ILT Systems – ACL-5500
  - Fisma – Dental 200, Dental 300, Dental 400
  - LaserMed – AccuCure 3000, AccuCure 1000, Pulstar
  - Premier Laser Systems – Arago II
  - ICS of North America – Cyber-Lase 2000
- Diode
  - CeramOptec – Model D15 Cerelas
  - BioLase Technology – Twilight Dental Diode Laser
  - OpusDent – Opus 10
  - Continuum Electro-Optics – DioDent
  - American Dental Technologies – DioLase 980 D
  - BioLase Technology – LaserSmile
  - MSq(MF) – Dio-Dent 10
  - HOYA ConBio – LVI Lase, DioDent II
  - Biolitec – Ceralas D100, Ceralas D15, Ceralas D25, Ceralas D980, Ceralas E 980 (E15/980, E30/980), 180W Ceralas D 980 (D180), Ceralas Multiwavelength 980/1470 nm Diode Laser System, Evolve HPD 980, Evolve 980/1470 nm Multiwavelength Diode Laser (Evolve Dual)
  - ProSurg – LaserTx
  - Xintec – Vectra
  - INTERmedic Arfran – INTERmedic, INTERmedic Diode Laser 980 nm System
  - Spectrum International – Prometey
  - Lasering – Velure S9/7D, Velure S9/15D
  - Elexxion – Claros Dental Laser System, Claros Nano
  - HOYA ConBio – DioDent Micro 810, DioDent Micro 980
  - Quanta System – Diode Medical Laser Family (808, 980 nm), Polysurge Diode Laser Family (808, 980)
  - KaVo America – GENTLeRay 980
  - Light Instruments – LiteDuo
  - OroScience – Curative 980
  - BioLase Technology – ezlase, EPIC 10
  - Fotona – XD Diode Laser
  - AMD Lasers – Picasso, Picasso Lite, Picasso Perio
  - Lambda Scientifica – Doctor Smile A-810, B-980
  - QuickLase – QuickLase DUAL+, 810, 980 Dental Lasers
  - Light Instruments – D-STORM
  - Dental Photonics – stLase
  - Lambda – Doctor Diode (810, 980 nm)
  - Discus Dental – SL3
  - Den-Mat Holdings – Sapphire ST
  - Asclepion Laser Technologies – Orion
- Frequency-Doubled Nd:YAG
  - Fisma – Corium 200, Corium 400
  - Lumenis – Novus Spectra
  - Cynosure – SmartLite D
Aphthous Ulcer Treatment

- Er, Cr:YSGG

- Carbon Dioxide
  - ILT Systems – ILT Genesis 2000
  - Lumenis – UltraPulse Encore
  - Lumenis – UltraPulse SurgiTouch
  - PhotoMedex – LaserPro CO2
  - Lumenis – OpusDent Family
  - MAX Engineering – Spectra-SP
  - Cynosure – Smart US 20 D, UltraSpeed, Smart Clinic
  - Alma – ThermoXEL, Pixel CO2
  - Lumenis – AcuPulse 30 and 40, AcuPulse 30/40ST and 40WG
  - Advanced Technology Laser – ATL-150, ATL-250, eBeam
  - Lutronic – DENTA III, DENTA III+
  - Lasering – SLIM Evolution II

- Nd:YAG
  - American Dental Technologies – PulseMasters
  - Incisive LLC – InPulse, PinPointe FootLaser
  - Millennium Dental Technologies – PerioLase
  - Lares Research – SunLase 800P (PocketPro)
  - Fotona – Fidelis Plus, Fidelis III, Fotona XP, LightWalker
  - PathoLase – PinPointe and PinPointe FootLaser
  - PinPointe USA – PinPointe FootLaser

- Diode
  - American Dental Technologies – PulseMaster 1000 ST DioLase ST
  - Dentek Lasersystems – Dentek LD-15
  - CeramOptec – Cerelas Diode Model D15, Cerelas Diode Model D10
  - BioLase Technology – Twilight, EZLase, Ezlase 10W, iLase, EPIC 10
  - OpusDent Ltd. – Opus 10
  - Continuum Electro-Optics – DioDent Dental Laser System
  - American Dental Technologies – DioLase 980 D
  - BioLase Technology – LaserSmile
  - MSq(M2) – Dio-Dent 10
  - HOYA ConBio – LVI Lase, DioDent II
  - Ivoclar Vivadent – Odyssey 2.4G
  - Biolitec – Ceralas D100, Ceralas D150, Ceralas D15, Ceralas D25, Ceralas D980, Ceralas E 980 (E15/980, E30/980), 180W Ceralas D 980 (D180), Ceralas Multiwavelength 980/1470 nm Diode Laser System, Evolve HPD 980, Evolve 980/1470 nm Multiwavelength Diode Laser (Evolve Dual
  - Sirona Dental Systems – SIROLaser, SIROLaser Advance
  - Vision Lasertechnik – MDL-10/15
  - ProSurf – LaserTx
  - Xintec – Vectra
  - CAO Group – DenLaser 800 Plus, Precise SHP Diode Laser
  - Spectrum International – Prometey
  - Elexion – Claros Dental Laser System
  - Ivoclar Vivadent – Odyssey Navigator
  - Quanta System – Diode Medical Laser Family (940, 980 nm), Polysurge Diode Laser Family (940, 980)
  - KaVo America – GENTLERay 980
  - Light Instruments – LiteDuo
Selected U.S. FDA Marketing Clearances
Lasers for Intraoral Use
by Company and Device (continued)
May 1990 – December 20, 2012

Aphthous Ulcer Treatment (continued)

- **Diode (continued)**
  - OroScience – Curative 980
  - Fotona – XD Diode Laser
  - AMD Lasers – Picasso, Picasso Lite, Picasso Perio
  - Lambda Scientifica – Doctor Smile A-810, B-980
  - QuickLase – QuickLase DUAL+, 810, 980 Dental Lasers
  - Light Instruments – D-STORM
  - Dental Photonics – stLase
  - Lambda – Doctor Diode (810, 940, 980 nm)
  - Discus Dental – SL3
  - Den-Mat Holdings – Sapphire ST, Sapphire Plus STM
  - China Daheng Group – PenLase
  - Asclepion Laser Technologies – Orion

- **Frequency-Doubled Nd:YAG**
  - Fisma – Corium 200, Corium 400
  - Lumenis – Novus Spectra
  - Cynosure – SmartLite D

- **Er:YAG**
  - KaVo America – KEY Laser 1242, KEY Laser 1242, 1243+
  - HOYA ConBio – VersaWave
  - J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A

Sulcular Debridement

- **Nd:YAG**
  - American Dental Technologies – PulseMasters
  - Lares Research – SunLase 800P (PocketPro)
  - Incisive LLP – InPulse, PinPointe FootLaser
  - Millennium Dental Technologies – PerioLase
  - Fotona – Fidelis Plus, Fidelis III, Fotona XP, LightWalker
  - PathoLase – PinPointe and PinPointe FootLaser
  - PinPointe USA – PinPointe FootLaser

- **Diode**
  - American Dental Technologies – PulseMaster 1000 ST DioLase ST
  - Premier Laser Systems – Aurora, Aurora HL
  - CeramOptec – Cerelas Diode Model D15, Cerelas Diode Model D10
  - Dentek Lasersystems – Dentek LD-15
  - BioLase Technology – Twilight
  - OpusDent Ltd. – Opus 10
  - Continuum Electro-Optics – DioDent Dental Laser System
  - American Dental Technologies – DioLase 980 D
  - BioLase Technology – LaserSmile, EZLase, ezlase 10W, iLase, EPIC 10
  - MSq(MF) – Dio-Dent 10
  - HOYA ConBio – LVI Lase, DioDent II
  - Ivoclar Vivadent – Odyssey 2.4G
  - Biolitec – Ceralas D100, Ceralas D150, Ceralas D15, Ceralas D25, Ceralas D980, Ceralas E 980 (E15/980, E30/980), 180W Ceralas D 980 (D180), Ceralas Multiwavelength 980/1470 nm Diode Laser System, Evolve HPD 980, Evolve 980/1470 nm Multiwavelength Diode Laser (Evolve Dual)
  - Sirona Dental Systems – SIROLaser, SIROLaser Advance
  - ProSurg – LaserTx
  - Xintec – Vectra
  - Spectrum International – Prometey
Sulcular Debridement (continued)

- Diode (continued)
  - Elexxion – Claros Dental Laser System, Claros Nano
  - Ivoclar Vivadent – Odyssey Navigator
  - Quanta System – Diode Medical Laser Family (940, 980 nm), Polysurge Diode Laser Family (940, 980)
  - KaVo America – GENTLERay 980
  - Light Instruments – LiteDuo
  - OroScience – Curative 980
  - Fotona – XD Diode Laser
  - AMD Lasers – Picasso, Picasso Lite, Picasso Perio
  - Lambda Scientifica – Doctor Smile A-810, B-980
  - QuickLase – QuickLase DUAL+, 810, 980 Dental Lasers
  - Light Instruments – D-STORM
  - Dental Photonics – stLase
  - Lambda – Doctor Diode (810, 940, 980 nm)
  - Discus Dental – SL3
  - Den-Mat Holdings – Sapphire ST, Sapphire Plus STM
  - China Daheng Group – PenLase
  - Asclepion Laser Technologies – Orion
  - CAO Group – Precise SHP Diode Laser
- Er,Cr:YSGG
- Er:YAG
  - KaVo America – KEY Laser 1242, KEY Laser 1242, 1243+
  - Fotona – Fidelis, Fidelis III, LightWalker
  - OpusDent – OpusDuo EC
  - HOYA ConBio – VersaWave
  - Lumenis – OpusDent Family
  - Sciton – Profile
  - Light Instruments – LiteTouch, LiteDuo
  - J. Morita Mfg. Corp. – AdvErL EVO MEY-1-A
- Carbon Dioxide
  - OpusDent – OpusDuo EC
  - Cynosure – Smart US 20 D, UltraSpeed, Smart Clinic, PerioPulse
  - Lutronic – DENTA III, DENTA III+

Caries Removal, Cavity Preparation, Enamel Roughening

- Er:YAG
  - Premier Laser Systems – Centauri
  - Continuum Biomedical – DeL 2940 Dental Erbium Laser, DeLite Dental Erbium Laser
  - KaVo KEY Laser 1242, KEY Laser 1242, 1243+
  - Fotona – Fidelis, Dualis, Fidelis III, LightWalker
  - OpusDent Ltd. – Opus 20, Spectrum
  - American Dental Technologies – PulseMaster Erbium
  - Cynosure – Smart 2940D
  - HOYA ConBio – VersaWave
  - Lumenis – OpusDent Family
  - Sciton – Profile
  - Light Instruments – LiteTouch, LiteDuo
  - J. Morita Mfg. Corp. – AdvErL EVO MEY-1-A
Caries Removal, Cavity Preparation, Enamel Roughening (continued)

- Er,Cr:YSGG

Illumination for Caries Detection

- Argon
  - Premier Laser Systems – Arago II
  - Fisma – Dental 200, Dental 300, Dental 400

Aid in Diagnosis of Dental Caries

- Diode
  - KaVo America Corporation – DIAGNOdent Laser Fluorescence Caries Detection Device, DIAGNOdent 205, DIAGNOdent 2190
  - Quantum Dental Technologies – The Canary System

Illumination for Endodontic Orifice Location

- Argon
  - Premier Laser Systems – Arago II
  - Fisma – Dental 200, Dental 300, Dental 400

Removal of Coronal Pulp, Adjunct to Root Canal Procedures

- Nd:YAG
  - Premier Laser Systems – Pegasus

- Diode
  - Premier Laser Systems – Aurora

Pulpotomy as Adjunct to Root Canal Retreatment

- Diode
  - CeramOptec – Cerelas D15, Cerelas Diode Model D10
  - Dentek Lasersystems – Dentek LD-15
  - BioLase Technology – Twilight, EZLase, ezlase 10W, iLase, EPIC 10
  - Premier Laser Systems – Aurora HL
  - OpusDent – Opus 10
  - Continuum Electro-Optics – DioDent Dental Laser System
  - American Dental Technologies – DioLase 980 D
  - BioLase Technology – LaserSmile
  - MSq(MF) – Dio-Dent 10
  - HOYA ConBio – DioDent II
  - Biolitec – Ceralas D810, Ceralas D980, Ceralas D100, Ceralas D150, Ceralas E 980 (E15/980, E30/980), 180W Ceralas D 980 (D180), Ceralas Multiwavelength 980/1470 nm Diode Laser System, Evolve HPD 980, Evolve 980/1470 nm Multiwavelength Diode Laser (Evolve Dual)
  - Sirona Dental Systems – SIROLaser, SIROLaser Advance
  - Vision Lasertechnik – MDL-10/15
  - ProSurg – LaserTx
  - Xintec – Vectra
  - INTERmedic Arfran – INTERmedic, INTERmedic Diode Laser 980 nm System
  - Spectrum International – Prometey
  - Elexxion – Claros Dental Laser System, Claros Nano
  - HOYA ConBio – DioDent Micro 810, DioDent Micro 980
  - Quanta System – Diode Medical Laser Family (808, 940, 980 nm), Polysurge Diode Laser Family (808, 940, 980)
Pulpotomy as Adjunct to Root Canal Retreatment (continued)

- Diode (continued)
  - KaVo America – GENTLEray 980
  - Light Instruments – LiteDuo
  - OroScience – Curative 980
  - AMD Lasers – Picasso, Picasso Lite, Picasso Perio
  - Lambda Scientifica – Doctor Smile A-810, B-980
  - QuickLase – QuickLase DUAL+, 810, 980 Dental Lasers
  - Light Instruments – D-STORM
  - Dental Photonics – stLase
  - Lambda – Doctor Diode (810, 940, 980 nm)
  - Asclepion Laser Technologies – Orion

- Nd:YAP
  - Lokki – Lokki DT

- Nd:YAG
  - Incisive LLC – InPulse, PinPointe FootLaser
  - Lares Research – SunLase 800P (PocketPro)
  - Millennium Dental Technologies – PerioLase
  - Fotona – Fidelis Plus, Fidelis III, Fotona XP, LightWalker
  - PathoLase – PinPointe and PinPointe FootLaser
  - PinPointe USA – PinPointe FootLaser

- Er,Cr:YSGG

- Er:YAG
  - Continuum Electro-Optics – DELight Dental Laser System
  - OpusDent – OpusDuo EC
  - HOYA ConBio – VersaWave
  - Lumenis – OpusDent Family
  - KaVo, KEY Laser 1242, 1243+
  - Sciton – Profile 2940
  - Light Instruments – LiteTouch, LiteDuo
  - Fotona – Fidelis III, LightWalker
  - J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A

Selective Removal of Enamel (First Degree) Caries

- Nd:YAG
  - American Dental Technologies – PulseMasters
  - Incisive LLC – InPulse, PinPointe FootLaser
  - Lares Research – SunLase 800P (PocketPro)
  - Millennium Dental Technologies – PerioLase
  - PathoLase – PinPointe and PinPointe FootLaser
  - PinPointe USA – PinPointe FootLaser

Removal of Filling Materials as Adjunctive Treatment During Root Canal Retreatment

- Nd:YAP
  - Lokki – Lokki DT

- Nd:YAG
  - Incisive LLC – InPulse, PinPointe FootLaser
  - Lares Research – SunLase 800P (PocketPro)
  - Millennium Dental Technologies – PerioLase
  - Fotona – Fidelis Plus, Fidelis III, Fotona XP, LightWalker
Selected U.S. FDA Marketing Clearances
Lasers for Intraoral Use
by Company and Device (continued)
May 1990 – December 20, 2012

Removal of Filling Materials as Adjunctive Treatment During Root Canal Retreatment (continued)
• Nd:YAG (continued)
  • PathoLase - PinPointe and PinPointe FootLaser
  • PinPointe USA - PinPointe FootLaser

Treatment of Herpetic Lesions
• Er,Cr:YSGG
  • BioLase Technology – WaterLase Millennium, Waterlase 3.0, Waterlase MD, Waterlase C100, Waterlase MD Turbo Plus
• Nd:YAG
  • Lares Research – SunLase 800P (PocketPro)
  • Fotona – Fidelis Plus, Fidelis III, Fotona XP, LightWalker
• Frequency-Doubled Nd:YAG
  • Fisma – Corium 200, Corium 400
  • Lumenis – Novus Spectra
  • Cynosure – SmartLite D
• Diode
  • BioLase Technology – LaserSmile, EZLase, ezlase 10W, iLase, EPIC 10
  • Vision Lasertechnik – MDL-10/15
  • Spectrum International – Prometey
  • Elexxion – Claros Dental Laser System, Claros Nano
  • Quanta System – Diode Medical Laser Family (940 nm), Polysurge Diode Laser Family (940)
  • OroScience – Curative 980
  • AMD Lasers – Picasso, Picasso Lite, Picasso Perio
  • Lambda Scientifica – Doctor Smile A-810
  • QuickLase – QuickLase DUAL+, 810, 980 Dental Lasers
  • Lambda – Doctor Diode (810, 940 nm)
  • Sirona Dental Systems – SIROLaser Advance
• Er:YAG
  • KaVo America – KEY Laser 1242, KEY Laser 1242, 1243+
  • HOYA ConBio – VersaWave
  • J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A
• Frequency-Doubled Nd:YAG
  • Fisma – Corium 200, Corium 400

Blood Flow Measurements
• Diode
  • Moor Instruments – DRT4 Laser Doppler Perfusion and Temperature Monitor, moorVMS-LDF1 and VMS-LDF2 Laser Doppler Perfusion and Temperature Monitor

Tooth Preparation to Obtain Access to Root Canal, Pulp Exirpation, Root Canal Debridement and Cleaning, Root Canal Preparation including Enlargement
• Er,Cr:YSGG
  • BioLase Technology – WaterLase Millennium, Waterlase 3.0, Waterlase MD, Waterlase C100, Waterlase MD Turbo Plus
• Er:YAG
  • Continuum Electro-Optics – DELight Dental Laser System
  • OpusDent – OpusDuo EC
  • HOYA ConBio – VersaWave
  • Lumenis – OpusDent Family
  • KaVo, KEY Laser 1242, 1243+
  • Sciton – Profile 2940
  • Light Instruments – LiteTouch, LiteDuo
Selected U.S. FDA Marketing Clearances
Lasers for Intraoral Use
by Company and Device (continued)
May 1990 – December 20, 2012

Tooth Preparation to Obtain Access to Root Canal, Pulp Extirpation, Root Canal Debridement and Cleaning, Root Canal Preparation including Enlargement (continued)

- Er:YAG (continued)
  - Fotona – Fidelis III, LightWalker
  - J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A

Cutting, Shaving, Contouring and Resection of Oral Osseous Tissues (Bone)

- Er,Cr:YSGG

- Er:YAG
  - HOYA ConBio – DELight Dental Laser System
  - HOYA ConBio – VersaWave
  - Lumenis – OpusDent Family
  - Sciton – Profile
  - Light Instruments – LiteTouch, LiteDuo
  - Fotona – Fidelis III, LightWalker
  - J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A

Apicoectomy Surgery

- Er,Cr:YSGG

- Er:YAG
  - HOYA ConBio – VersaWave
  - Lumenis – OpusDent Family
  - Sciton – Profile
  - Light Instruments – LiteTouch, LiteDuo
  - Fotona – Fidelis III, LightWalker
  - J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A

Coagulation of Extraction Sites

- Diode
  - MSq(M2) – Dio-Dent 10

- Carbon Dioxide
  - PhotoMedex – LaserPro CO2
  - Lumenis – AcuPulse 30/40ST and 40WG

Osteotomy, Osseous Crown Lengthening, Osteoplasty

- Er,Cr:YSGG

- Er:YAG
  - HOYA ConBio – VersaWave
  - Lumenis – OpusDent Family
  - Sciton – Profile
  - Light Instruments – LiteTouch, LiteDuo
  - Fotona – Fidelis III, LightWalker
  - J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A
Selected U.S. FDA Marketing Clearances
Lasers for Intraoral Use
by Company and Device (continued)
May 1990 – December 20, 2012

Laser-Assisted New Attachment Procedure (cementum-mediated periodontal ligament new-attachment to the root surface in the absence of long junctional epithelium)
- Nd:YAG
  - Millennium Dental Technologies – PerioLase
  - Fotona – Fidelis III
- Carbon Dioxide
  - Cynosure – Smart US 20 D, UltraSpeed, Smart Clinic, PerioPulse
  - Lutronic – DENTA III, DENTA III+
- Er,Cr:YSGG
  - Biolase Technology – Waterlase MD, Waterlase MD Turbo Plus
- Diode
  - AMD Lasers – Picasso, Picasso Lite, Picasso Perio

Reduction of Bacterial Level (Decontamination) and Inflammation
- Diode
  - OroScience – Curative 980
  - QuickLase – QuickLase DUAL+, 810, 980 Dental Lasers

Aid in Detection (and Localization) of Subgingival Dental Calculus
- Diode
  - KaVo America Corporation – DIAGNOdent Perio Tip, DIAGNOdent 2190 with Periodontal Probe

Root Canal Disinfection after Endodontic Instrumentation
- Er,Cr:YSGG
  - Biolase Technology – Waterlase, Waterlase MD, Waterlase C100, Waterlase MD Turbo Plus

Removal of Subgingival Calculi in Periodontal Pockets
- Er:YAG
  - KaVo – KEY Laser III 1243
  - Fotona - LightWalker
  - J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A
- Er,Cr:YSGG
  - Biolase Technology – Waterlase C100, Waterlase MD Turbo Plus

Removal of Highly Inflamed Edematous Tissue Affected by Bacteria Penetration of the Pocket Lining and Junctional Epithelium
- Diode
  - AMD Lasers – Picasso, Picasso Lite, Picasso Perio
  - QuickLase – QuickLase DUAL+, 810, 980 Dental Lasers
- Er,Cr:YSGG
  - Biolase Technology – Waterlase C100, Waterlase MD Turbo Plus
- Er:YAG
  - J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A

Removal of Pathological Tissues (i.e., Cysts, Neoplasm or Abscess) and Hyperplastic Tissues (i.e., Granulation Tissue) from around the Apex
- Er,Cr:YSGG
  - Biolase Technology – Waterlase C100, Waterlase MD Turbo Plus
- Er:YAG
  - J. Morita Mfg.Corp. – AdvErL EVO MEY-1-A