

Implementing Laser Dentistry into your Dental Practice...

Can you see the light?

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Mastership with the
Academy of Laser Dentistry
In-Office Laser Consultant

Laser Safety

Laser Classification

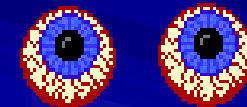
Class III

Requires special training, eye protection.

Dental Argon Curing Lasers, Soft Lasers

Class IV

Potentially hazardous,
specific safety measures.



Dental and Medical
Surgical Laser Systems

Class IV Lasers

- ❖ High powered Dental Lasers
- ❖ Hazard to eyes, skin, fire, laser can catch things on fire
- ❖ Generates air contaminants
- ❖ Hazardous plasma radiation
- ❖ LSO required
- ❖ Maximum Permissible Exposure (MPE) values for eye & skin
- ❖ Nominal Ocular Hazard Distance (NOHD)
- ❖ Nominal Hazard Zone (NHZ)

Class 3B and Class 4 Lasers

 WARNING	
	Class 4 Laser Controlled Area
	VISIBLE and/or INVISIBLE LASER RADIATION
	Avoid Eye or Skin Exposure to Direct or Scattered Radiation.
	Laser Eye Protection Required: OD\geq 5 @ 970nm
	970nm Wavelength Diode Laser
	14 Watts Peak Power - 7 Watts Average Power
	635-650 nm Diode Laser Maximum Power 1mW Continuous Wave
	Laser Safety Officer: Dr. Scott Benjamin

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- ❖ **NHZ- Nominal Hazard Zone**

This is the space within which the MPE is being exceeded. Anyone standing inside the NHZ must be wearing laser protection

- ❖ **NOHD- Nominal Ocular Hazard Distance**

The distance from the emission port of the laser, within which the MPE is being exceeded. Anyone inside the NOHD must be wearing their laser specific protective eyewear.

Laser Operator

The NHZ and the NOHD is not
WAVELENGTH SPECIFIC

It is....

DEVICE SPECIFIC

See owners manual of laser to determine

If 5W laser has an NHZ of 5 feet

At 4W the NHZ is NOT 4 feet

Standards Organizations and National Regulatory Requirements

CDRH, ANSI, OSHA

Other National Bodies

Laser Safety Officer

Laser Safety Mechanisms

Adverse Effects Reporting

Training

Eye and Tissue Protection

Environment

Proper Warning Signs

Controlled Area

Limited Access

Reflective Surfaces

Minimized

High Volume Evacuation

Laser Use Documentation

Laser Safety Combustible Gases

Nitrous Oxide and Laser Usage

2005 ANSI standard, Z-136.3, states that

Nitrous Oxide/Oxygen can be used with proper scavenger and suction techniques.

However,...

And,...Ether, alcohol-based topical anesthetics, and alcohol moistened gauze should be used with caution in close proximity to the laser beam. Patients with oxygen- tanks should be left outside NHZ.

Laser Safety Officer

- o Keeper of the Key or Passcodes
- o Sets up standard operating procedures
- o Understands the operational characteristics of the laser
- o Knows output limitations of the device
- o Supervises staff education and training
- o Ensures laser maintenance and beam alignment, and calibration
- o Posts warning signs
- o Oversees personal protective wear
- o Supervises medical surveillance and incident reporting
- o Is familiar with the biological and other potential hazards of the laser
- o Knows of all regulations such as OSHA and ANSI
- o Determines the potential hazard zone and non-hazard zone

Machine Safety Mechanisms

- On/off key lock switch
- Safety interlocks
- System time-out
- Guarded footswitch
- Emergency stop button
- Remote interlock jack
- Software diagnostics
- Other protections as necessary

Laser Safety

Adverse Effects

- o Manage the patient, take necessary emergency measures
- o Contact the Manufacturer
- o After investigation, other organizations may become involved

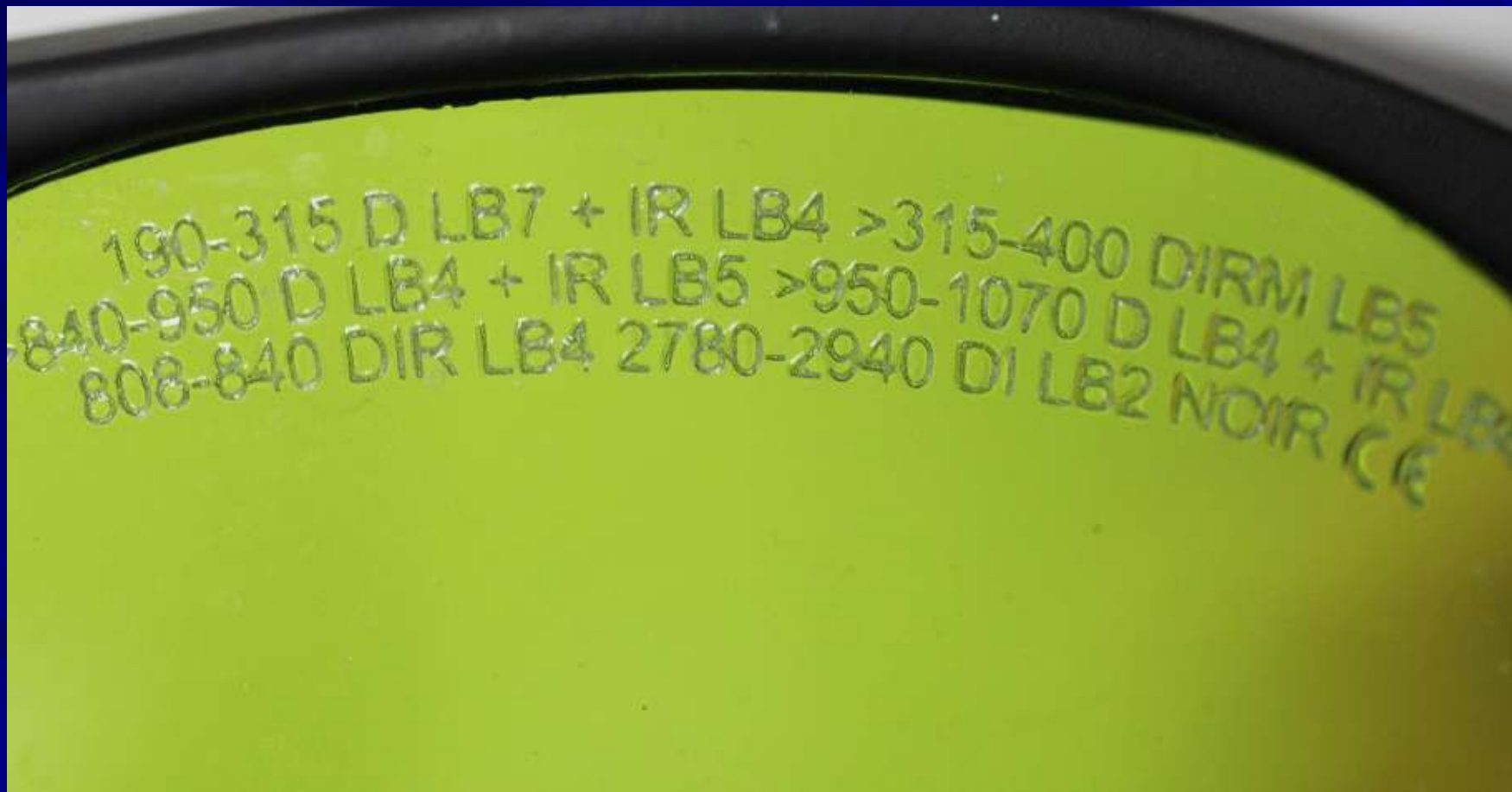
Eye Protection

ALWAYS!
Use the
appropriate
glasses
specified for
the wavelength
being used!



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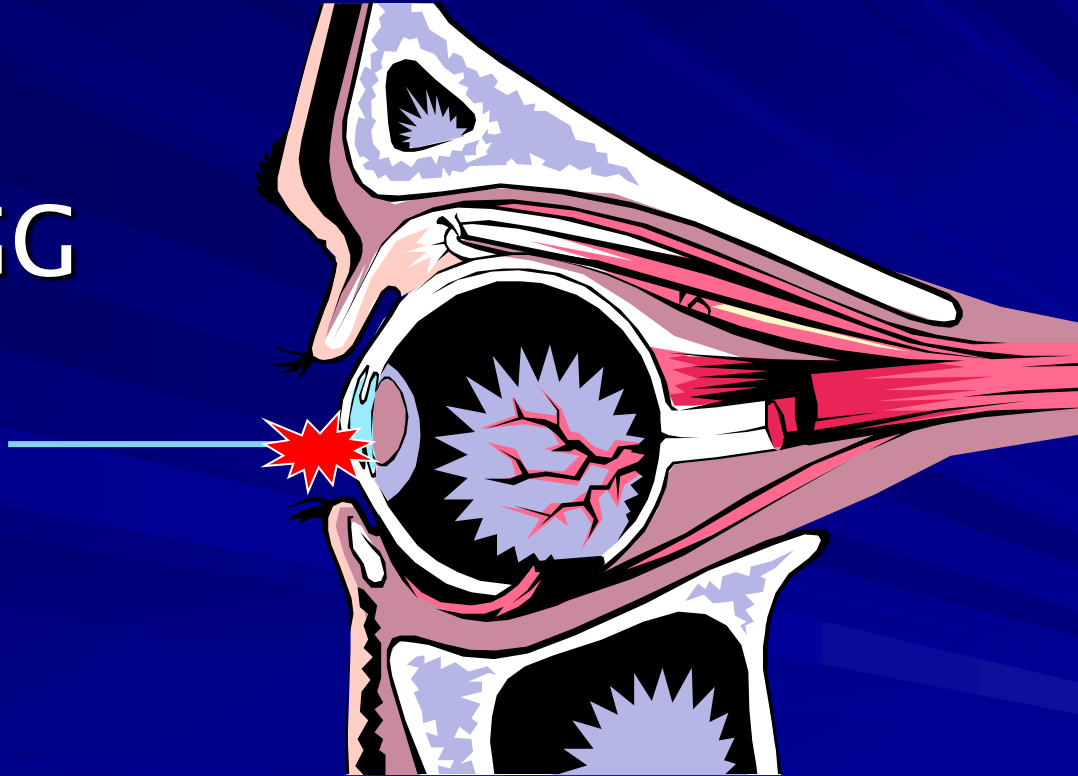
Multiple Wavelengths



Corneal Damage

Laser Wavelength

- ❖ Er,Cr:YSGG
- ❖ Er:YAG
- ❖ CO₂



Lens Damage

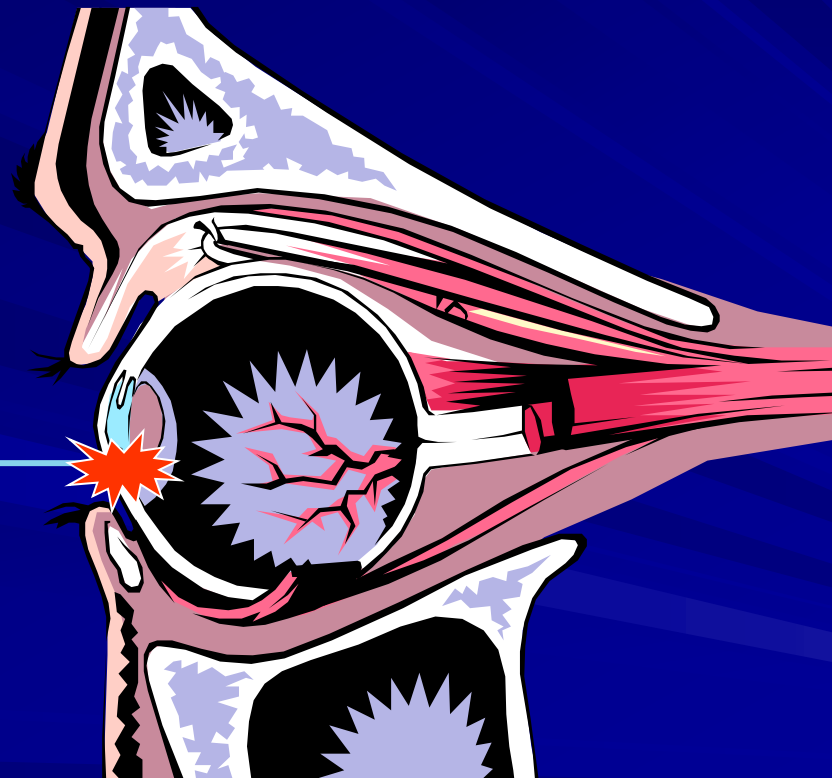
Laser Wavelength

❖ *Diode*

❖ *Nd:YAG*

❖ *Er,Cr:YSGG*

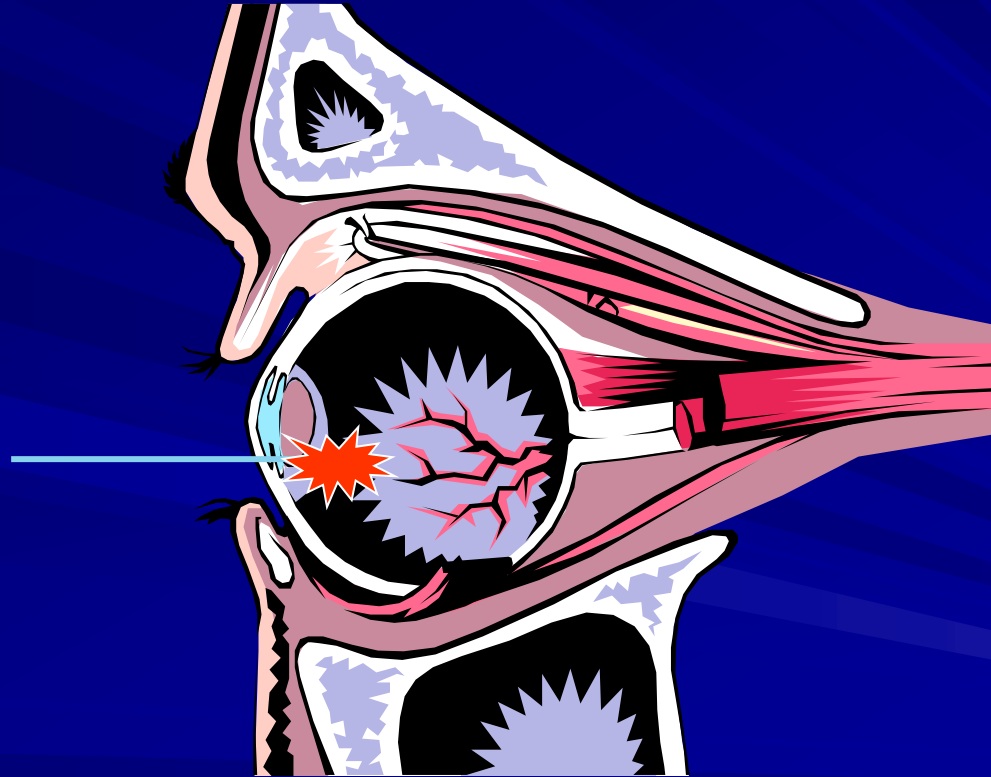
❖ *Er:YAG*



Aqueous Damage

Laser Wavelength

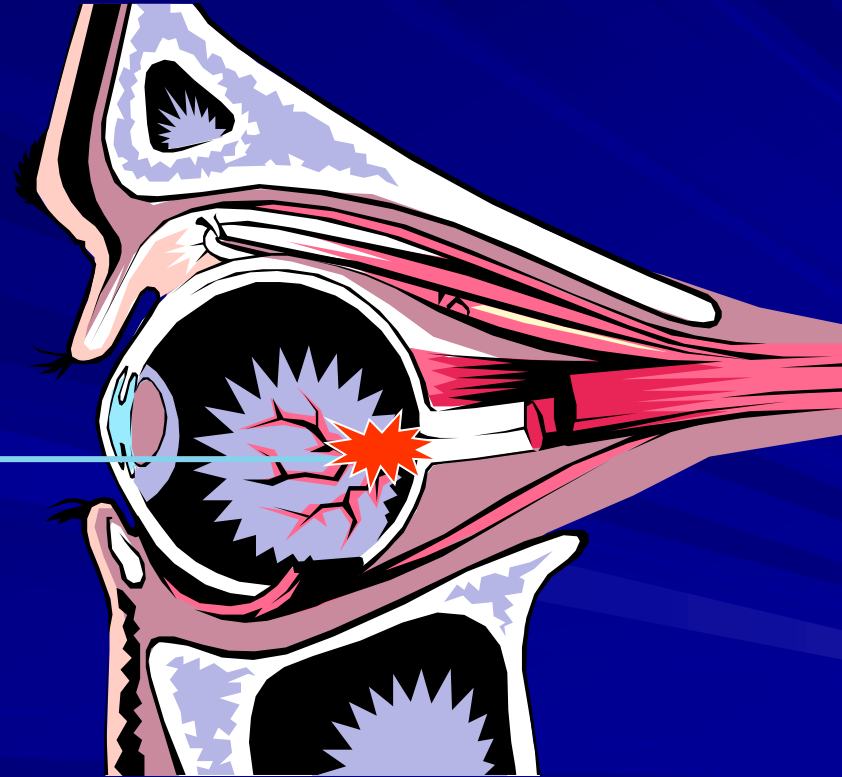
- ❖ Ho: YAG
- ❖ Er,Cr:YSGG
- ❖ Er:YAG



Retinal Damage

Laser Wavelength

- ❖ Argon
- ❖ HeNe
- ❖ Diode
- ❖ Nd:YAG



Signs of Eye Exposure

- ❖ Headache
- ❖ Extreme Watering
- ❖ Gritty, Sand
- ❖ Burning
- ❖ Popping noise
- ❖ Floaters
- ❖ No Pain

Laser Safety / Environment

- Minimize reflective surfaces
- Proper warning signs
- Limited access



High Volume Evacuation

- o To help cool site
- o To remove Plume
 - carbonized tissue and blood
 - contains: Toluene, Acrolein, Formaldehyde,
 - can contain viruses and bacteria

Laser Safety

Laser Use Documentation

Chart notes should include:

- o fiber size/spot size
- o tip shape and size
- o emission mode--continuous/pulsed
- o energy/power setting(s)
- o time of exposure
- o eye protection worn

Destroying Biofilm

- Must disrupt their attachment or control pathogens
- Mechanical removal
 - Brushing
 - Flossing
 - Interdental tools
 - Periodontal instrumentation
- Chemotherapeutics

Oral Hygiene Assessment

Probing Depths and Bleeding upon Probing

- Bleeding is NOT normal
- BOP – 33% chance of breakdown
- Consistent BOP – 90% chance of breakdown
- Consistent BOP is most accurate predictor of disease

Goals of Non-Surgical Treatment

- Anti-Infective Therapy
- To control pathogenic bacterial colonization to minimize the host response
- To minimize the impact of systemic factors
- To eliminate or control local risk factors
- Halt disease progression
- Minimal cementum removal and damage to tooth
- Clinical attachment gains

Advantages of the Laser

- ❖ Cutting, Vaporizing, Coagulation
- ❖ Seals small blood vessels and lymphatics creating a bloodless operating site
- ❖ Reduces bacterial contamination of the wound site
- ❖ Curves and folds negotiable, Precision, minimally invasive
- ❖ Reduces post operative pain and swelling
- ❖ May reduce surgical time
- ❖ Less anesthesia

Advantages of Lasers for Soft Tissue Therapy

- The Laser is very precise
- Bacterial reduction in the sulcus is excellent
- Coagulation of the treatment site is superior
- The laser can be used on every segment of the population regardless of age
- There are no allergic reactions to the laser

Diode Antibacterial Properties

- AA: PI: PG
(Moritz, 2006)

- Bleeding Index ↓ 96%
- AA Reduced
- More comfort post-op
- Faster healing

- Kreisler (2001)
- Horton (1992)

- Safe use in pockets at low power
- Up to 56 days repopulation

Moritz (2005)

- Up to 90 days reduction of colony forming units

So...How do lasers help??

Lasers help promote wound healing
By putting photons into a periodontal pocket, energy is collected in the mitochondria “the powerhouse” to give the body a chance heal itself

Laser energy allows fibroblasts to help create attachments, collagen helps hold tissue tight, allowing an opportunity for bone to be regenerated (regrown), over time

Popular Lasers on the market for Dental Hygiene

Diode Lasers

Biolase Epic



940nm

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Diode Lasers

Biolase Epic Hygiene



980nm

Diode Lasers

Ultradent
Gemini
Dual
Wavelength
810 & 980



Diode Lasers



3 x PBM adapters (25 mm, 7 mm, 3 mm)

Dual wavelengths (810 nm + 980 nm)

100 watts of peak super-pulsed power

Wi-Fi enabled for easy software updates
and technical support

Ultradent Gemini Evo

Diode Lasers

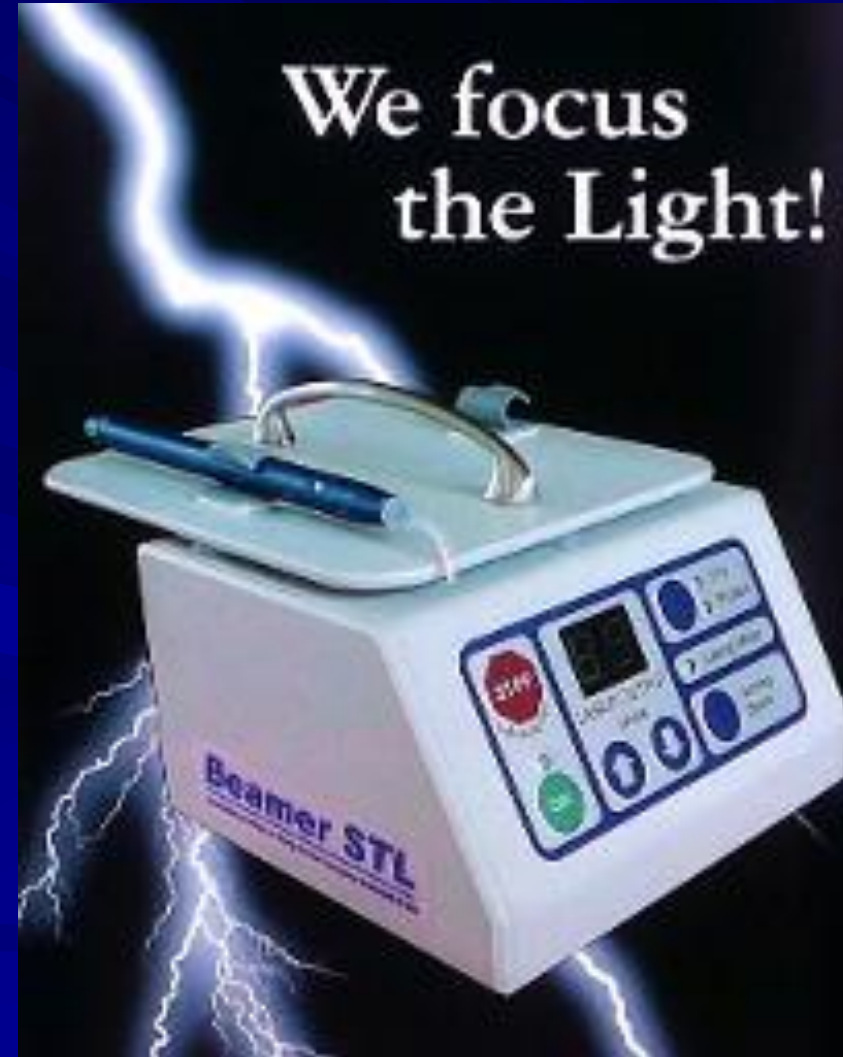


Diode, AMD Picasso
810nm

Diode Lasers

Beamer STL

980 nm wavelength



Conditioning of the Tip

- Conditioning the tip of a diode laser focus the energy efficiency and effectively and allows the laser to treat the tissue at a much lower power. No need to condition a Nd:YAG tip
- Keep in mind, once a diode comes in contact with soft tissue for a certain amount of time- it becomes “conditioned” and can cut tissue or ablate cells
- Conditioning can be done with articulating paper or a marker.

How to cleave a fiber

- If the laser that you are using has a rubber jacket, you must first remove or strip the fiber with a special tool.
- Keep in mind that some lasers have more than one jacket.
- You then must cleave or cut the fiber using special scissors or stone to achieve the desired cleave.
- Some fibers have tips that are preset and are disposable.

Preparing your laser fiber

Fiber Technique

- ❖ Use fiber to full pocket depth
- ❖ Angle fiber away from the tooth
- ❖ Place fiber into sulcus before firing
- ❖ Keep fiber moving

Laser Applications for Dental Hygiene

- ▶ Aphthous Ulcers/Herpetic Lesions
- ▶ Photobiomodulation-external (PBM)
- ▶ Tooth Desensitization
- ▶ Laser Whitening
- ▶ Laser Bacterial Reduction (LBR)
- ▶ Laser Assisted Periodontal Therapy (LAPT)
- ▶ Photobiomodulation-perio (PBM)
- ▶ Hemostasis

Please check your State's Practice Act for scope of practice

Laser Assisted Periodontal Therapy (LAPT)

LAPT is administering laser energy within the periodontal pocket for profound decontamination. It will result in tissue interaction.

Reasons to provide LAPT

- ▶ Removing the inflammatory factors
- ▶ Profound bacterial reduction within the pocket
- ▶ Promoting growth factors for healing
- ▶ Ultimate goal of tissue rehabilitation

Laser Settings

Decontaminate Settings, 300-400 fibers

- ❖ Diode 810-1064 nm
 - .5 Watts continuous adjust as needed
 - 12-15 seconds/site
- ❖ Nd:YAG 1064nm
 - 30mJ, 50 Hz....= 1.5 Watts adjust as needed
 - 40 seconds/site

Laser Bacterial Reduction (LBR)

LBR is administering low power laser energy within the sulcus throughout the entire dentition

Reasons to provide LBR

- ▶ Reduce bacteremia
- ▶ Reduce cross contamination
- ▶ Reduce bacterial load to help prevent attachment loss

Aphthous & Herpetic Lesions

- ❖ Non-Contact mode
- ❖ Non-initiated tip, CW
- ❖ HVE mandatory
- ❖ Place laser 2mm away from lesion
- ❖ Start at low setting, .3W (300mW)
- ❖ Increase by .2W every 45-60 seconds *, for 5 settings
(0.3W, 0.5W, 0.7W, 0.9W 1.0W)

Treating Aphthous/Herpetic Lesion



Diode Root Desensitization

- Fiber - cleaved and uninitiated
- Pre-Test - air/touch
- Fluoride Varnish - place on area
- Laser - 30 seconds in stages
from 0.3W-0.8W CW
- ReTest - air/touch

FDA cleared procedure

Hemostasis

SUGGESTED SETTINGS:

Emission Mode: CW (Continuous Wave)

Duty Cycle: N/A

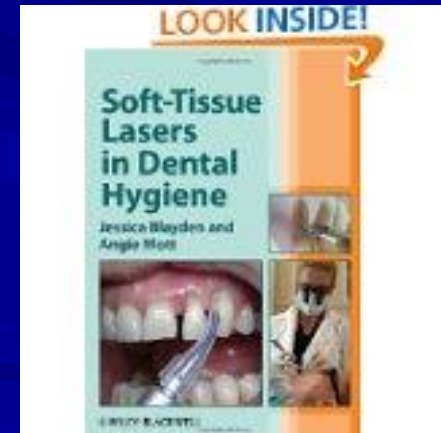
Average Power: 0.5 Watts

Peak Power: 0.5 Watts



Resources for Lasers

- NEW BOOK BY ANGIE MOTT
- SOFT-TISSUE LASERS IN DENTAL HYGIENE
- by: Jessica Blayden & Angie Mott
- Wiley-Blackwell
- ISBN 978-0-4709-5854-4
- Can order through Amazon.com



Additional Resources for LASERS

The Academy of Laser Dentistry

www.laserdentistry.org

At this time we are the only
unbiased international organization
of clinicians, researchers and
academicians for laser dentistry

In-Office Laser Certification Courses

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