



# LASERS in HYGIENE



[AdvancedDentalHygiene.com](http://AdvancedDentalHygiene.com)

# Joy Raskie, RDH

AdvancedDentalHygiene.com



- Registered Dental Hygienist in Littleton, Colorado, since 2003
- CEO, Director of Education at Advanced Dental Hygiene
  - AdvancedDentalHygiene.com
  - Specialize and teach dental laser training courses worldwide
- Associate Fellowship and Fellowship from the World Clinical Laser Institute (WCLI) and Advanced Laser Training. Working towards my Mastership
- Advanced Proficiency from the Academy of Laser Dentistry (ALD)
  - Presented 5 laser case studies with a high degree of difficulty
  - One of 20 RDH's who hold this certification worldwide

## Course Objectives

**01**

Explanation of the inflammatory process and lasers role

**02**

Discover how lasers are utilized in the hygiene department

**03**

Overview of PBM and how lasers can reduce pain, inflammation and accelerate healing

**04**

Review of laser safety

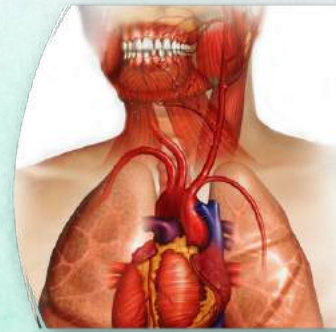
# EXPLANATION OF THE INFLAMMATORY PROCESS AND RISK FACTORS

## RISK FACTORS

COVID-19	PERIODONTAL DISEASE
People 65+ yrs and older	Advancing age
Smoking	Smoking
Diabetes	Diabetes
Chronic lung disease/asthma (Mod-severe)	Pulmonary Disease
Serious heart conditions	Heart Disease (cardiovascular disease)
Obesity	Obesity/poor nutrition
Immune weakening medications	Medications
Cancer treatment	Immunocompromised Status
Bone marrow or organ transplantation	Low Birth weight and premature delivery
Liver Disease	Rheumatoid arthritis, osteoporosis
Kidney Disease	Stress

## MOUTH-BODY CONNECTION

1. Hasturk, H., Kantarci, A. Activation and Resolution of Periodontal Inflammation and Its Systemic Impact. *Periodontol* 2000. 2015; 69(1): 255-273. doi:10.1111/prd.12105.
2. University of Florida. (2005, March 31). Live Oral Bacteria Found in Arterial Plaque. *ScienceDaily*.
3. Desvarieux, M., Demmer, R.T., Rundek, T., et al. Relationship between Periodontal Disease, Tooth Loss, and Carotid Artery Plaque: The Oral Infections and Vascular Disease Epidemiology Study (INVEST). *Stroke*. 2003; 34(9): 2120-2125. doi:10.1161/01.STR.0000085086.50957.22.
4. Dhadse, P., Gattani, D., Mishra, R. The Link between Periodontal Disease and Cardiovascular Disease: How Far We Have Come in Last Two Decades? *J Indian Soc Periodontol*. 2010; 14(3): 148-154. doi:10.4103/0972-124X.75908.
5. Fisher, M.A., Borgnakke, W.S., Taylor, G.W. Periodontal Disease as a Risk Marker in Coronary Heart Disease and Chronic Kidney Disease. *Curr Opin Nephrol Hypertens*. 2010; 19(6): 519-526. doi:10.1097/MNH.0b013e32833eda38.



## ASK YOURSELF THESE QUESTIONS

**01**

How are you looking at each patient's disease?

**02**

What are your patients risk factors/potential?

**03**

Are you being dictated by insurance?

**04**

Are you doing all you can do?

## THE CONNECTION

### TOOTH/BODY/INFLAMMATION

**One out of every two adults has Periodontitis**

**30+ yrs = 47% have Periodontitis**

**65+ yrs = 63% has Moderate to Severe Periodontitis**

*Eke PI, Dye BA, Wei L, Thornton-Evans GO, Genco RJ; CDC Periodontal Disease Surveillance workgroup: Prevalence of periodontitis in adults in the United States: 2009 and 2010. J Dent Res. 2012;91(10):914-920.*

### INFLAMMATION PROCESS

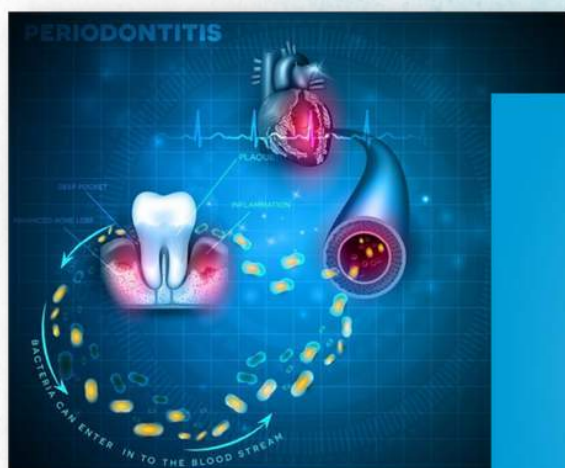
**Gingivitis** – the first stage of periodontal disease, is defined as “gingival inflammation without loss of connective tissue attachment”.

**Periodontitis** - The presence of gingival inflammation at sites where there has been a pathological detachment of collagen fibers from cementum and the junctional epithelium has migrated apically.

This also leads to tooth - supporting alveolar bone loss and eventually tooth loss itself

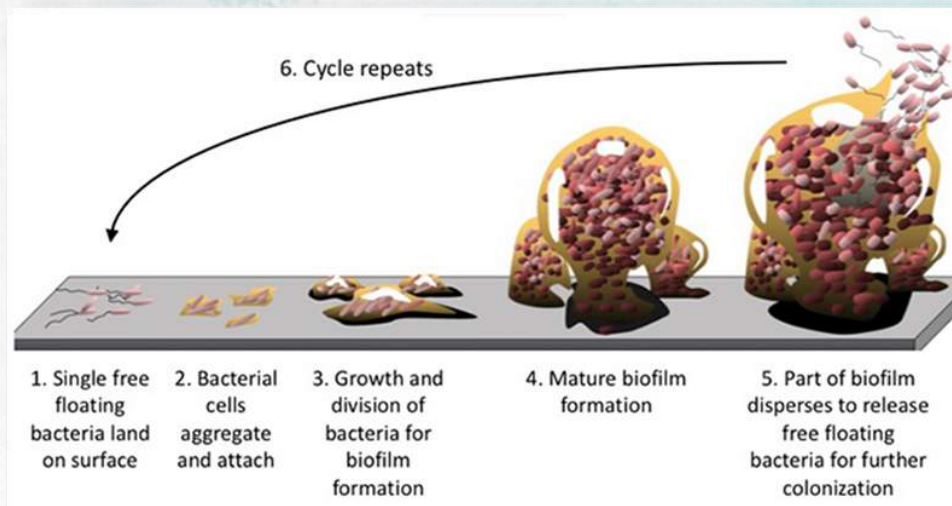


Armitage GC: Clinical evaluation of periodontal diseases, *Periodontol* 2000 7:39-53, 1995.



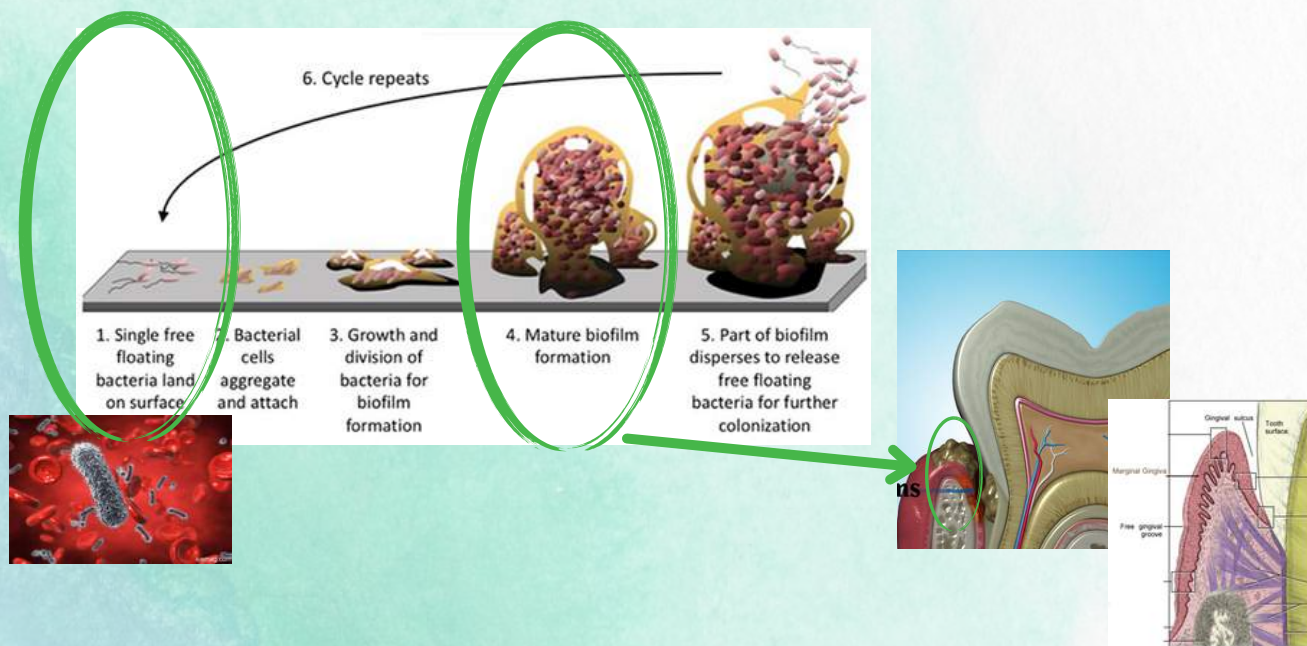
Manor A, Lebendiger M, Shiffer A, Tovel H: Bacterial invasion of periodontal issues in advanced periodontitis in humans, *J Periodontol* 55(10) 567-573, 1984.

## WHAT IS REALLY GOING ON...



# LASERS ROLE IN THE INFECTION PROCESS

## HOW LASERS ARE INCORPORATED



## DISCOVER HOW LASERS ARE UTILIZED IN THE HYGIENE DEPARTMENT



**LASER BACTERIAL REDUCTION**

## LASER BACTERIAL REDUCTION

This is like a pre-procedural rinse but reduces bacteria UNDER the gums



## LASERS AND BACTERIA RESEARCH

Lasers are bactericidal

- The diode laser group showed **100% reduction of long-term bacteria** (Periodontal specific), whereas 58.4% of the controls showed an improvement.
- The diode laser group **reduced their bleeding on probing (BOP) by 96.9%** compared to 66.7% in the control group.



*Moritz A, Schoop U, Goharkhay K, et al: Treatment of periodontal pockets with a diode laser. Department of Conservative Dentistry, Dental School of the University of Vienna, Austria, Lasers Sug Med 22 (5):302-311, 1998.*

## LBR – WHAT ARE WE DOING?

Reduce or eliminate the risk of bacteremia caused by instrumentation

- Allows us to remove bacteria and reduce bacterial flow into your bloodstream

Prevent cross-contamination

- We inadvertently pick up a bacterial infection in one area of the mouth and move it to other areas.

**Lower micro count in aerosols** created **during ultrasonic instrumentation**



*Assaf M, Yilmaz S, Kuru B, Ipci SD, Noyun U, Kadir T. Effect of the diode laser on bacteremia associated with dental ultrasonic scaling: A clinical and microbiological study. Photomed Laser Surg. 2007;25:250-6.*

## Coronavirus



## And Lasers?

### ROI FOR LBR

(RETURN ON INVESTMENT)

LBR \$35 4 Day Work

Week \$44

- 4 pts day=\$140, week=\$560, \$2240 month, 26,880 yr / \$36,608
- 5 pts day=\$175, week=\$700, \$2800 mo, 33,600 yr / \$45,760
- 6 pts day=\$210, week=\$840, \$3360 mo, \$40,320 yr / 54,912
- 8 pts day=\$280, week=\$1120, \$4480 mo, \$53,760 yr / \$73,216

Buy a laser \$7000

- *Paid off less than 3 months with ONLY doing 4 patients a day LBR*



**LASER**  
**DECONTAMINATION**

# LASER-ASSISTED PERIODONTAL THERAPY (LAPT) LASER DECONTAMINATION (LD) (SAME THING)



## LASER DECONTAMINATION – (LD) (WHY I CALL IT LD AND WHY IT IS OK TO INITIATE YOUR TIP IN SOME STATES)

Just as conventional *root debridement* removes biofilm and accretions from the hard tooth surface, *laser decontamination* removes biofilm within the necrotic tissue of the pocket wall. The laser energy interacts strongly with inflamed tissue components (diseased tissue, red-orange complex bacteria) and less strongly with healthy tissue.

*Convissar, RA: Principles and Practice of laser Dentistry, New York: Mosby, (3) 31. 2011. Print.*

This *nonsurgical therapy* uses very low settings and decontaminates rather than cuts the tissue.

*Coluzzi DJ, Convissar RA: Atlas of laser applications in dentistry, Chicago, 2007. Quintessence.*

## WHAT ARE WE DOING?

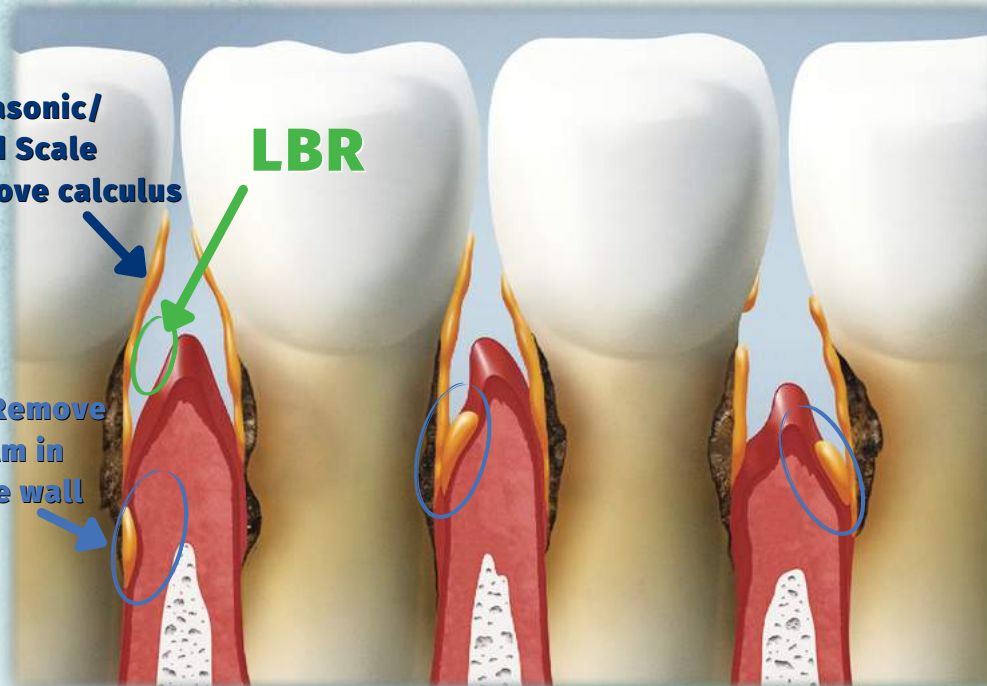
- **Decontaminating** the gingival lining of the pocket wall
- **Reducing bacteria** in the pocket
- Reducing biofilm that has migrated into gingival wall
- Inducing biostimulation--Promoting **healing** of the tissues
- The laser will help us clean deeper into the tissue where we can't get with our instruments



**Ultrasonic/  
Hand Scale  
Remove calculus**

**LBR**

**LD - Remove  
Biofilm in  
tissue wall**



## RESEARCH SRP + LASER | SRP ALONE

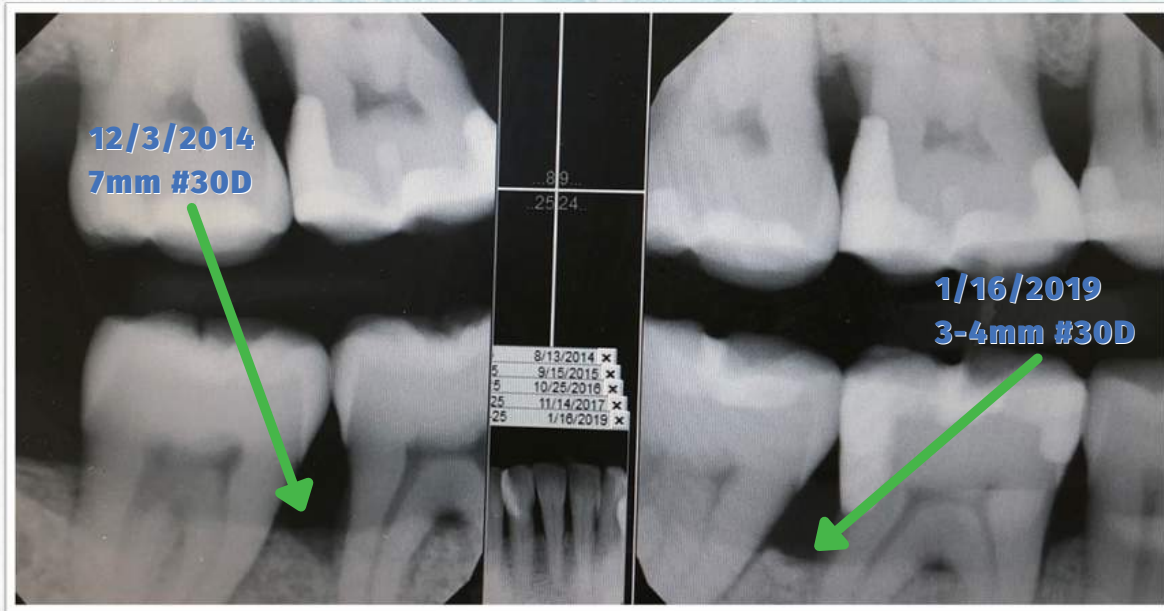
In ALL articles ~ SRP + Laser = more bacterial reduction than SRP alone

- Significantly higher reduction in periodontal pathogens after 2 months compared to SRP alone<sup>1</sup>
- Considerable bacterial elimination, especially of *Actinobacillus actinomycetemcomitans*, from periodontal pockets<sup>2</sup>

1. Fenol A, Boban NC, Jayachandran P, Shereef M, Balakrishnan B, Lakshmi P. A Qualitative Analysis of Periodontal Pathogens in Chronic Periodontitis Patients after Nonsurgical Periodontal Therapy with and without Diode Laser Disinfection Using Benzoyl-DL Arginine-2-Naphthylamide Test: A Randomized Clinical Trial. *Contemp Clin Dent*. 2018 Jul-Sep;9(3):382-387.
2. Moritz A, Gutknecht N, Doertbudak O, et al. Bacterial reduction in periodontal pockets through irradiation with a diode laser: a pilot study. *J Clin Laser Med Surg*. 1997;15(1):33-37.
3. Crispino A, Figliuzzi MM, Iovane C, Del Giudice T, Lomanno S, Pacifico D, et al. Effectiveness of a diode laser in addition to non-surgical periodontal therapy: Study of intervention. *Ann Stomatol (Roma)* 2015;6:15-20.
4. Elavarasu S, Suthanthiran T, Thangavelu A, Mohandas L, Selvaraj S, Saravanan J. LASER curettage as adjunct to SRP, compared to SRP alone, in patients with periodontitis and controlled type 2 diabetes mellitus: A comparative clinical study. *J Pharm Bioallied Sci*. 2015;7(Suppl 2): S636-S642.
5. Gupta, Sunil Kumar et al. "An evaluation of diode laser as an adjunct to scaling and root planning in the nonsurgical treatment of chronic periodontitis: A clinico-microbiological study." *Dentistry & Medical Research*. 2016; 4(2): 44-49.



## WHAT ABOUT BUILDING BONE?



## RESEARCH ARTICLES ON REGENERATION

- Findings showed a positive effect on the proliferation of both **gingival fibroblasts** and **periodontal ligament fibroblasts**, as well as their responses to inflammation

*Ren, C., McGrath, C., Jin, L. et al. Effect of diode low-level lasers on fibroblasts derived from human periodontal tissue: a systematic review of in vitro studies. Lasers Med Sci 31, 1493–1510 (2016)*



Pires Oliveria DA, de Oliveria RF, et al:  
Evaluation of low-level laser therapy of  
osteoblastic cells, Photomed laser surg  
26(4):401-404, 2008

- Diode lasers have a biostimulatory effect on bone tissue as well as enhanced **osteoblastic** (bone-forming cells) proliferation

*Amid R, Kadkhodazadeh M, Ahsaie MG, Hakakzadeh A. Effect of low level laser therapy on proliferation and differentiation of the cells contributing in bone regeneration. J Lasers Med Sci. 2014;5(4):163–170.*

Dortbudak O, Haas R, Mallath-Pokorny G:  
Biostimulation of bone marrow cells  
with a diode soft laser, Clin Oral  
Implants Res 11(6):540-545, 2000



# LASER USAGE AROUND IMPLANTS



## PERI-IMPLANT MUCOSITIS

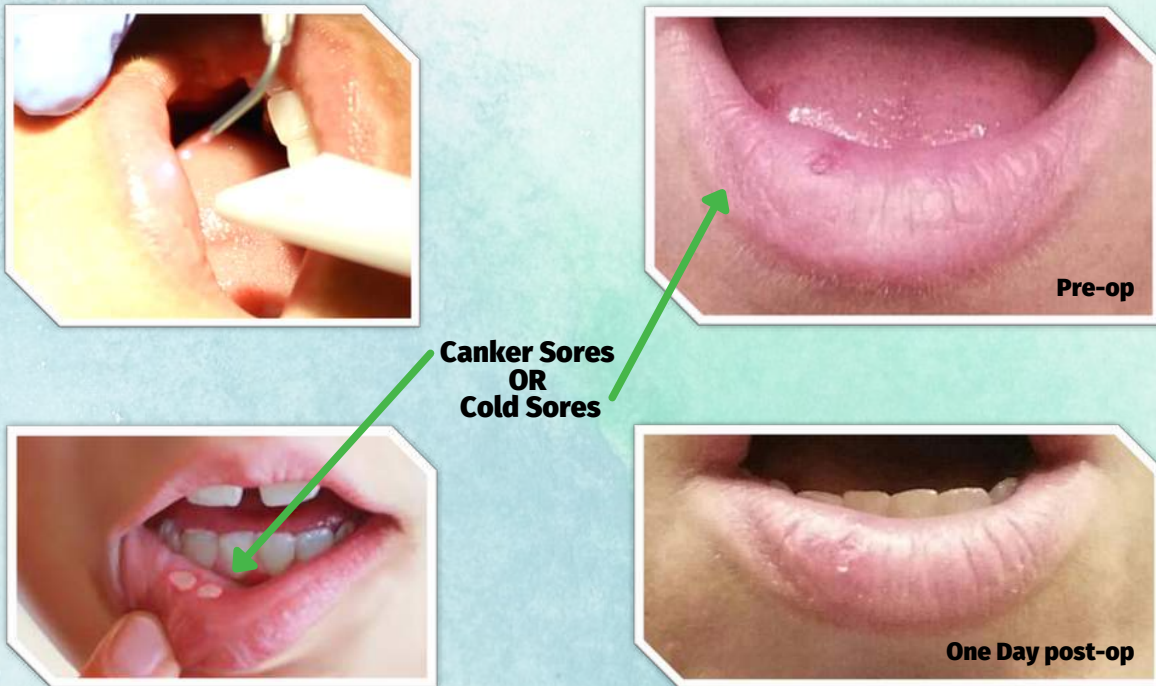
- Gum infection/infection in the tissue
- Disinfect gum pocket
- Clean deeper than we can get with our instruments<sup>1</sup>
- Stimulate healing<sup>2</sup>



1. Malmqvist, Sebastian et al. "Using 445 nm and 970 nm Lasers on Dental Implants-An In Vitro Study on Change in Temperature and Surface Alterations." *Materials* (Basel, Switzerland) vol. 12,23 3934. 27 Nov. 2019
2. Pires Oliveria DA, de Oliveria RF, et al: Evaluation of low-level laser therapy of osteoblastic cells, *Photomed laser surg* 26(4):401-404, 2008



**LESION  
TREATMENT**



## WHAT ARE WE DOING?

- Killing viral particles
- Inactivating lesion
- Begin healing and dormant process
- Cauterizes nerve endings
- Biostimulating the area
- It immediately will feel “numb”
- Shrink throughout the day and crust over the next day



## RESEARCH – LASER CAN HELP WITH REOCCURRENCE

### Article showing less of a reoccurrence of Herpes from multiple treatments<sup>1</sup>

- “Evaluated laser therapy on 50 patients with recurrent herpes simplex infection (at least 1x mo for more than 6 mo), randomized, double-blind placebo-controlled trial. Laser group received daily laser tx for 2 wk, placebo had fake laser tx. In conclusion, they found a total of 10 laser therapy tx significantly lower incidence of local recurrence of herpes. <sup>1</sup>

1. Schindl A1, Neumann R. Low-intensity laser therapy is an effective treatment for recurrent herpes simplex infection. Results from a randomized double-blind placebo-controlled study. J Invest Dermatol. 1999 Aug;113(2):221-3

## REVIEW OF THE LITERATURE

*Systemic Review aimed to evaluate the effectiveness of laser therapy in management and prevention of Recurrent herpes labialis (RHL)*

- All included studies found laser to be effective in the management and prevention of RHL, without any side effects. They found laser to be a safe and effective treatment alternative for the management of RHL.



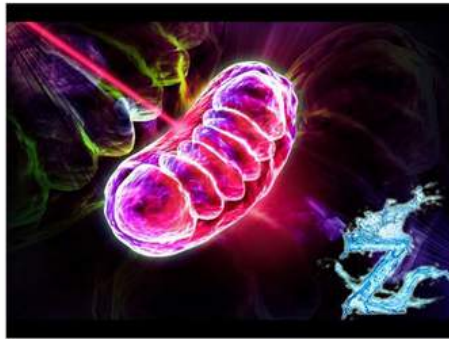
### WHAT ARE WE DOING?

- Changing the viscosity of the fluid in the dental tubules
- Can use varnish afterward

### HOW LONG DOES IT LAST?

- Can last forever
- If it comes back check - What is causing the sensitivity?
- Abrasive toothpaste -No tarter control toothpaste
- Keep using sensitivity toothpaste
- Check bite if it comes back
- Most times it is occlusal forces
- Make sure they are in the correct bite appliance



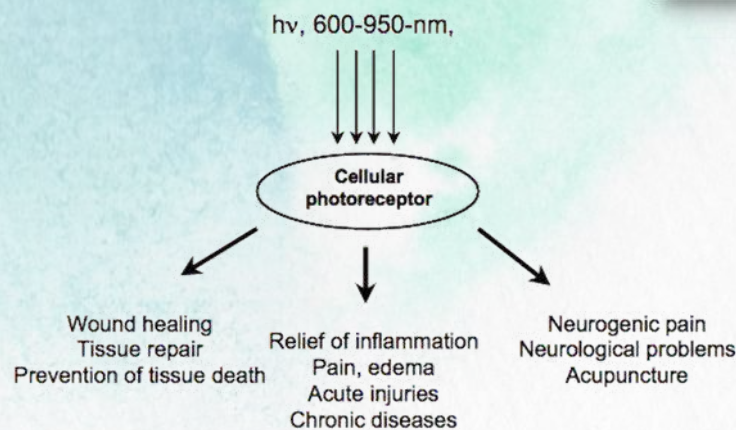


**PBM**  
**or LOW-LEVEL**  
**LASER THERAPY**

# OVERVIEW OF PBM AND HOW LASERS CAN REDUCE PAIN, INFLAMMATION AND ACCELERATE HEALING

## WHAT IS PHOTOBIOMODULATION

- Photo (light), bio (life & cells), modulation (modify or influence change)
- Also known as:
  - Low-level laser therapy
  - Cold Laser therapy



*Hamblin MR, Demidove TN. Mechanisms of low level light therapy. In: Hamblin MR, Waynant RW, Anders J, editors. Mechanisms for Low-Light Therapy, January 22 and 24, 2006, San Jose, Calif. Proc. SPIE 6140. Bellingham, Wash.: SPIE – The International Society for Optical Engineering, 2006:614001-1 614001-12.*

## PBM USES IN DENTISTRY

- Mucositis
- Analgesic & Acupuncture like effects
- Nausea & Gagging
- Facial Pain Relief After Long Dental Appointments
- TMJ/TMD
- Dry Mouth- Stimulation mode
- Sinusitis
- Dental Infections
- Dry Socket
- Post extraction
- Endodontics – root canal/post-op pain
- Implants
- Restorative Procedures, Fillings, Cementing Crowns
- Nerve Regeneration
- Orthodontics (movement of teeth-stimulation)
- Paresthesia
- Gingival Grafts

## TMJ & TREATMENT OF FACIAL PAIN

- Find out where they are experiencing pain and/or soreness
- Treat that area
- Clinical forms for patient to complete evaluating pain areas
- Clinical Interview (Let the patients tell you their story)
  - A good clinical interview is key to a good diagnosis



## TALKING TO PATIENTS ABOUT TMJ

- First thing- determine what is the main factor triggering pain
  - Ortho consult (if bite-related)
  - Sleep consult (sleep apnea)
  - Nightguard for bruxism
- Then let the patient know about new technology-PBM therapy
- Easy, non-invasive, pain-free treatment option (added to any treatment to help prevent, further TMJ pain)



## NAUSEA & GAGGING

- Apply laser to P6 acupuncture point
- Reduces nausea & gagging
- Bioinhibition
- High anxiety or very strong gagger-apply laser to all 3 points



## ANESTHETICS/ANALGESIC AFFECT

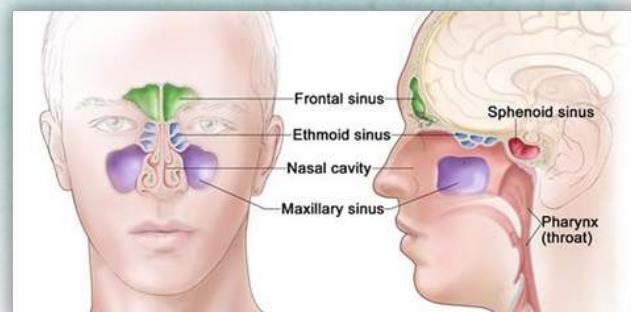
- **Effects of Phototherapy:**
  - Faster uptake of anesthesia
  - Faster elimination of anesthesia
- **Treatment Tip:**
  - If you apply the laser for faster uptake of anesthesia, the increased circulation will also eliminate the anesthesia faster
  - This is very useful for kids who have received anesthetic as it will decrease the probability of biting tongues and lips



*Dr. Gerry Ross, ddsross@rogers.com*

## SINUSITIS

- Reduces pain & pressure in sinus
- Apply to Submandibular lymph nodes, along the base of the zygomatic arch, ethmoid sinus at the base of the forehead above the eyes, lymphatics
- Wear safety glasses and be careful not to shine the laser light into eyes
- Make sure to cover patient's eyes with white gauze depending on the angle of laser on face





## MUCOSITIS

- **Mucositis** is the painful inflammation and ulceration of the mucous membranes, usually as an adverse effect of chemotherapy and radiotherapy treatment for cancer
- Chemotherapy-patients get oral mucositis sores 30% of time
- Radiation – 100% by 3rd treatment
- This feels like 100 cold sores in your mouth at the same time



PBM improves outcomes for cancer patients  
 Oral Oncol. 2017 Aug;71:11-15. doi:  
 10.1016/j.oraloncology.2017.05.018. Epub 2017  
 Jun 3. Antunes HS1, Herchenhorn D2, Small IA3,  
 Araújo CMM4, Viêgas CMP4, de Assis Ramos G3,  
 Dias FL5, Ferreira  
 CG6.<http://www.ncbi.nlm.nih.gov/pubmed/?term=28688677>



### Oral Mucositis

after chemotherapy in cancer patient  
 660nm laser used

**After 6 sessions**

(Courtesy Alyne Simoes)



### Mucositis

(from nasal carcinoma)

Postoperative view  
 13 days after, 3 sessions  
 808nm laser

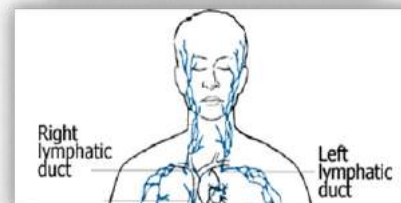
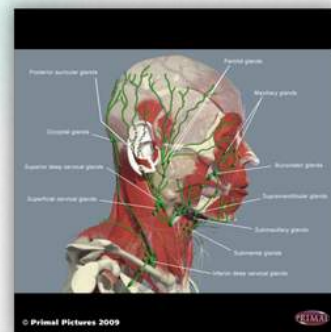
Principles and Practice of Laser Dentistry

## APPLICATION FOR LYMPHATIC DRAINAGE (ANY DENTAL INFECTIONS)

- Reduction of edema (swelling)
- Stimulates the immune system and brings neutrophils to the site of infection for faster healing

### Treatment Tips:

- PBM Application will NOT preclude the use of antibiotics but will stimulate the effect of antibiotics by stimulating the lymphatic system
- If dealing with a lot of infection, treat the lymphatic ducts, which are adjacent to the sternum, between the first and second rib
- Be sure to aim the laser away from the thyroid gland when applying the laser



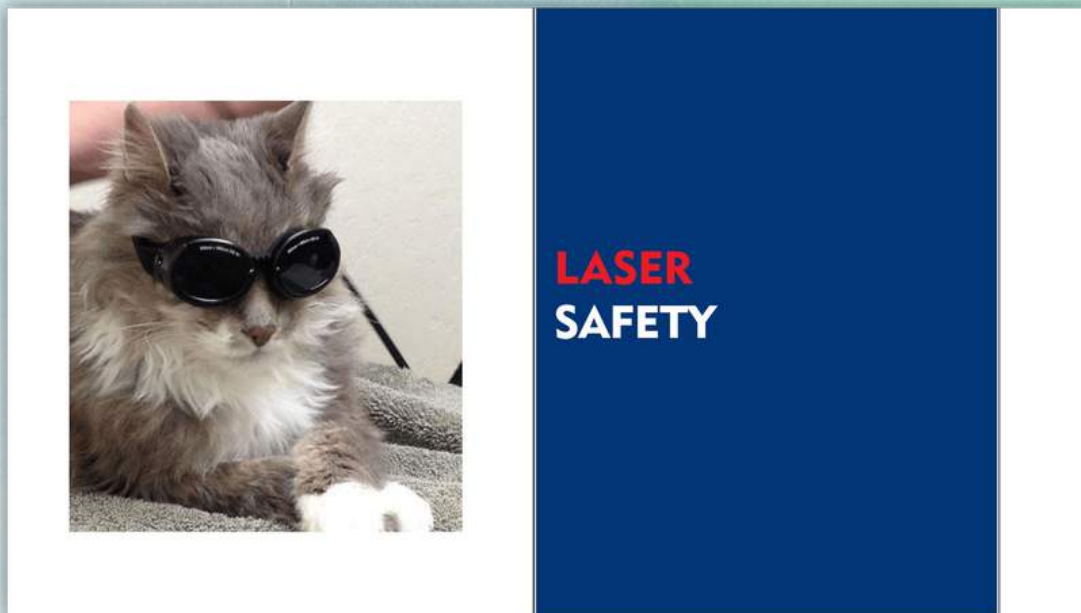
Courtesy of Dr. Gerry Ross, [ddsross@rogers.com](mailto:ddsross@rogers.com)

## LASER BIOSTIMULATION / PBM

- Increases
- **Collagen production**, enzyme activity, micro-and lymph-circulation, **fibroblast proliferation**
- Decrease
- local hypoxia, inflammatory effect, and pain

*“There is a good evidence that the enhanced cell metabolic functions seen after LLLT are the result of activation of photo-receptors within the electron transport chain of mitochondria. Future trials of new LLLT applications in dentistry should make use of standardized, validated outcomes, and should explore how the effectiveness of the LLLT protocol used may be influenced by wavelength, treatment duration, dosage, and the site of application.”*

*Snophia Suresh, Satyanarayana Merugu, Nimisha Mithradas, Sivasankari. Low-level laser therapy: A biostimulation therapy in periodontics. Department of Periodontics, Thaimoogambigai Dental College, Chennai, Tamil Nadu, India, J Research of Dental Sciences. 6(1): 53-56, 2015*



**Laser Glasses to be worn by everyone in room**  
(Patient, clinician, assistant)

**Only use Soap and water to clean laser glasses/inserts**

Check the wavelength on glasses  
match wavelength on laser



## LASER PLUME

- Use of high-volume evacuation system to remove aerosols and laser plume is recommended
  - Plume is composed of 95% water and 5% particulate matter, organic and inorganic chemicals, and microorganisms.<sup>1</sup>
  - Organic chemicals such as benzene, toluene, formaldehyde, and cyanide have been isolated within the plume; inorganic chemicals include carbon monoxide, sulfur, and nitrogen compounds.<sup>2</sup>
- General ventilation, local exhaust ventilation, room suction systems, smoke evacuators, filters<sup>3</sup>
  - Importance of a smoke evacuator
    - Captures the pollutants close to the source of emission, prevents dispersion of particulate matter and contaminants in workplace air, reduces unpleasant odor, minimizes exposure of the health care professionals and the patient to contaminants, keeps the surgical field clear, prevents corrosion and damage to other equipment due to corrosive chemicals in surgical plume, maintains a safe environment.<sup>3</sup>

1. Douglas OH: Laparoscopic hazards of smoke, *Surg Serv Manage AORN* 3(3), 1997.
2. Ulmer B: Air quality in the operating room, *Surg Serv Manage AORN* 3(3), 1997.
3. Katoch S, Mysore V. Surgical Smoke in Dermatology: Its Hazards and Management. *J Cutan Aesthet Surg*. 2019;12(1):1-7.

## HIGH-EFFICIENCY FILTRATION MASK OR N95 RESPIRATOR

- HEPA respirator masks such as N95 -filtration efficiency of 99.93% can filter submicrometer-sized particles.<sup>1,2</sup>
- Level 3 Mask has a particle filtration efficiency of 99.75% at 0.1  $\mu$
- Common mask 5.0- $\mu$ -filtration efficiency of 91.53%
- To protect yourself and your clients, proper PPE and a high-efficiency mask/respirator is recommended.<sup>3</sup>

1. Katoch S, Mysore V. Surgical Smoke in Dermatology: Its Hazards and Management. *J Cutan Aesthet Surg*. 2019;12(1):1-7.
2. Lu W, Zhu XC, Zhang XY, Chen YT, Chen WH. *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi*. 2016;34(9):643-646.
3. Barrett WL, Garber SM. Surgical smoke: a review of the literature. Is this just a lot of hot air?. *Surg Endosc*. 2003;17(6):979-987.

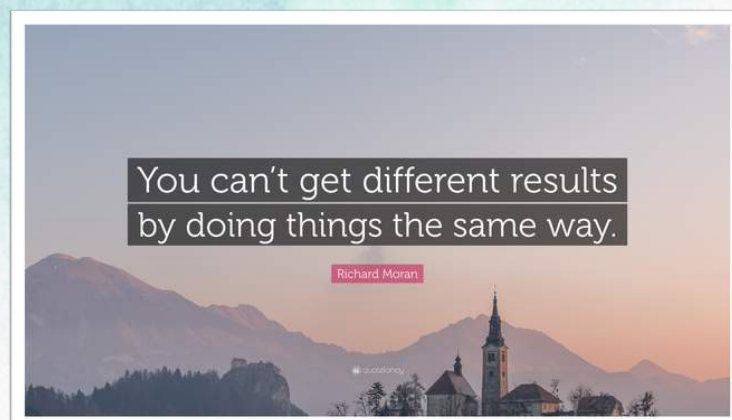


## LASER SAFETY OFFICER / LSO

- Responsible for educating the dental team in the safe use of the laser
- Who needs Training?
  - Anyone entering the Nominal Ocular Hazard Distance (NOHD)
    - 5 feet with no eyewear – SiroLaser Advance+ manual
    - 12 feet or 1.5 inches if you are wearing safety glasses – Biolase Epic manual
- Enforcing safety practices
  - “laser in use” signs
  - laser off or standby mode
  - LSGU
  - High-vac suction
  - Limit reflective surfaces
- Test fire laser before patient in a chair - daily
- TEXAS – required to register your LSO
- Keep records of incidents that relate to the failure of laser or any adverse effects related to laser therapy – report such incidents as prescribed by law.
  - Assure medical follow-up has been sought or has occurred

## LASER SAFETY OFFICER RESPONSIBILITIES

- Keeper of the key
- Sets up standard operating procedures
- Understands the operational characteristics of the laser
- Knows output limitations of the device
- Determines controlled area
- Posts warning signs
- Supervises staff education and training
- Ensures laser maintenance and beam alignment, and calibration
- Oversees personal protective wear
- Supervises medical surveillance and incident reporting
- Is familiar with the biological and other potential hazards of the laser
- Knows of all regulations such as OSHA and ANSI, or those of the appropriate country
- Determines the potential hazard zone and no-hazard zone
- Keeps a log of recorded laser use and parameters employed



# DIODE LASER TRAINING AND CERTIFICATION

LIVE AND ONLINE LASER TRAINING COURSES  
ADVANCED DENTAL HYGIENE

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**\*WE ALSO OFFER  
PRIVATE IN-OFFICE  
CONSULTING**



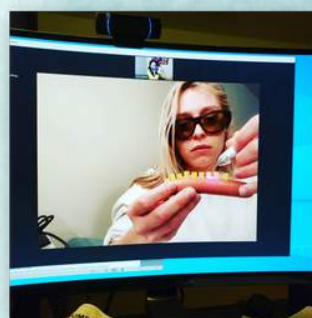
[ADVANCEDDENTALHYGIENE.COM/12CEONLINE](http://ADVANCEDDENTALHYGIENE.COM/12CEONLINE)

## 12CE ONLINE LASER CERTIFICATION

2 HOUR LIVE, HANDS-ON  
WITH YOUR LASER  
AT YOUR OFFICE/HOME

AFTER THIS COURSE, YOU WILL  
IMMEDIATELY BE ABLE TO IMPLEMENT  
LASER TREATMENT THE VERY NEXT DAY

CONFIDENCE



## RESEARCH ARTICLES

1. Gutierrez T. Diode laser for bacterial reduction and coagulation: An adjunctive treatment for periodontal disease. *Contemp Oral Hyg.* 2005; 5(12):20-21.
2. Moritz A, Schoop U, Goharkhay K, et al: Treatment of periodontal pockets with a diode laser. Department of Conservative Dentistry, Dental School of the University of Vienna, Austria, *Lasers Surg Med* 22(5):302-311, 1998.
3. Eke PI, Dye BA, Wei L, Thornton-Evans GO, Genco RJ; CDC Periodontal Disease Surveillance workgroup: Prevalence of periodontitis in adults in the United States: 2009 and 2010. *J Dent Res.* 2012;91(10):914-920.
4. Convissar, Robert. A. *Principles and Practice of Laser Dentistry.* New York: Mosby, 2011. Print.
5. Armitage GC: Clinical evaluation of periodontal diseases, *Periodontol* 2000 7:39-53, 1995.
6. Wilson TG, Kornman KS: *Fundamentals of periodontics*, ed 2, Chicago, 2003, Quintessence.
7. Harrel SK, Molinari J: Aerosols and splatter in dentistry: a brief review of the literature and infection control implications, *J Am Dent Assoc* 135:429-437, 2004.
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