Nano-oral medicine
Therapeutic biomodulating laser care

Lawrence Kotlow DDS
340 Fuller Road
Albany, New York
12203
Website: KIDDSTEETH.COM

Photobiomodulating laser treatment described by many different names

- LLLT
- Cold Laser Therapy
- Laser Therapy
- Soft Laser Therapy
- Light Therapy
- Low Level Laser Therapy
- Photo Therapy
- Laser Biostimulation

Anecdotal or Scientific

PhotoBiomodulation effects in nature and medicine

No heat is generated

In the USA: Off label use

Low Level lasers are considered by the FDA as NSR medical device that poses NONSIGNIFICANT RISK (NSF) to patients.

No FDA -IRB (Institutional Review Board) review is required if the off label use is used to treat patients and is not part of a research project involving humans.
Today open your mind and begin to think outside the box

Lawrence Kotlow DDS

A resonating laser (harmonizes, wave formation) piggy backs effects)
combines 8 LEDs
red and blue light and 12 Laser Diodes cluster
470-940 nm @ 3-9 joules per cycle
Mode 1 = reduces pain, reduce inflammation = use with injuries
Mode 2 = relaxes nervous system, opens glands
Mode 3 = antiviral, antibacterial, immune system stimulated

2 Stimulating Lasers:
860nm InGaAIP Diode @ 50 mw 2.2 joules/min Class 3a; acupuncture points, cycle =3 minutes
808 nm @ 500Mw GaAlAs Diode = 18 joules/minute Class 3b invisible infrared, bone and teeth, joints

Photobiomodulation (LLLT) in a Pediatric Dental Practice

- Indirect effect: Biostimulation
- Non-Surgical: does not produce heat
- Visible and non-visible wavelengths
- Continuous & gated pulse
- Rigid tips
- Hand held units :very portable
- Painless
- Reduced use of drugs for pain control

The red and near infrared light (600nm-1000nm) commonly used in LLLT can be produced by laser or high intensity LEDs. The intensity of LLLT lasers and LED's is not high like a surgical laser. There is no heating effect.

Science

1. Lasers that operate using energy densities below the threshold where irreversible changes in cells occur.

2. *Stimulates natural biological processes preventing cells from operating in an acidic(redox) state to an alkaline state to perform optimally.

For additional peer reviewed articles

How Does PBM work? Very briefly

( James Carroll, visit Thorlaser.com )
- Uses light energy which can be absorbed in the form of photons from both PBM and superlumious diodes to create cellular and biological effects in the body.
- Power Plant of the cell where ATP is produced
- Absorbed by the Mitochondria within the cell
- After a traumatic cellular injury: PBM reduces what is called “oxidative stress”, basically the mitochondria in damaged tissue produce “nitric oxide” that competitively displaces O2 ,creates Hypoxic cells binds to the “Cytochrome c oxidase(COX)”, resulting in oxidative stress, this in turn reduces ATP production. The LLLT (red and Near-infrared , 650-1100nm range )energy is absorbed by the cytochrome c oxidase displacing the problematic nitric oxide thus reduces this oxidative stress and allows for increased ATP formation. Thus quicker cell repair.

How PBM Lasers can be used in a Dental Practice

Q1000

- A resonating laser (harmonizes, wave formation) piggy backs effects
- combines 8 LEDs
- red and blue light and 12 Laser Diodes cluster
- 470-940 nm @ 3-9 joules per cycle
- Mode 1 = reduces pain, reduce inflammation = use with injuries
- Mode 2 = relaxes nervous system, opens glands
- Mode 3 = antiviral, antibacterial, immune system stimulated

2 Stimulating Lasers:
- 860nm InGaAIP Diode @ 50 mw 2.2 joules/min Class 3a; acupuncture points, cycle =3 minutes
- 808 nm @ 500Mw GaAlAs Diode = 18 joules/minute Class 3b invisible infrared, bone and teeth, joints
Analgesia

LLLT creating a nerve block. Higher irradiance / energy treatments can induce an analgesic effect by disrupting fast axonal transport in small diameter fibres, in particular nociceptors. This temporary (reversible) inhibition of A-delta and C fibre transmission reduces tonic peripheral nociceptive afferent input and facilitates reorganisation of the modulation of synaptic connections. Repeated treatments lead to a reduction in central sensitisation.

Clinical everyday uses

- Reducing nausea
- Controls gag reflex
- Reduces the need for numbing & mandibular blocks
- Improved numbing when local is used
- Maintaining tooth vitality after trauma
- Reduces post-traumatic swelling
- Improves soft tissue healing
- Treatment of herpes & herpes type lesions
- TMJ discomfort
- Muscle trismus : releases tight muscles
- Reduction in bleeding

Hegu- acupuncture point

Chinese Name: Hegu (English translation: Joining Valley)
Location: On the dorsum of the hand, between the 1st and 2nd metacarpal bones, in the middle of the 2nd metacarpal bone on the radial side.
Classification: Yuan-Source point of the Large Intestine Meridian Command Point of the head and face

Acupuncture + Photobiomodulating laser treatment

P6 (Nei guan meridian point)=reduce gag reflex

The gagger!


Salt NACL

P6- Acupressure Point is located in adults on the anterior surface of the forearm, approximately three finger widths down from the first wrist crease (children about two+ fingers)
Creating laser initiated hard tissue analgesia with hot lasers

- A photobiostimulating effect
- Reduced local anesthetic requirements
- Allows for using High Speed handpiece
- Success rate 80-90 percent of the patients

Using hot (surgical) lasers to produce photobiostimulating effects

Photobiomodulation (LLLT) in a Pediatric Dental Practice

Response of one child

Reduction in the need for a mandibular block

- Increased uptake of anesthetic agent (can also be used to get rid of numbing more quickly)
- Reduction of swelling if you injure a blood vessel during injection
- Effective patient management

Dental and soft tissue trauma benefits

Trauma to upper anterior teeth

660 nm laser probe for 2 minutes

Anterior tooth trauma in the primary dentition: incidence, classification, treatment methods, and sequelae: a review of the literature.
2. Andreasen JO : Endod Dent Traum, 1998;Feb;14(1) 31-44 Sequelae of trauma to primary incisors. Complications in the primary dentition
Trauma to upper anterior teeth, partially extruded

660 nm laser probe for 2 minutes

- 1 month
- 3 months
- 2 years

1/28/2008

Maintain tooth vitality (660nm)

- Traumatic injury to primary teeth
- In many cases normal effect of trauma causes primary teeth to devitalize in 2-6 weeks after traumatic injury.
- Laser 1 minute (day 1 and day 3) = vitality remains

Initial trauma 5 days post trauma

2 months post trauma 9 mo post trauma 2 years post

Lawrence Kotlow DDS

14 month old infant

Partial avulsion of lower central incisors and fracture of buccal plate of bone 11/3/2010

2.5 days
6 days
2.5 days
6 days

Facial trauma

- Initial trauma
- 25 days
- 25 days
- 6 days

Lawrence Kotlow DDS

Partial avulsion of maxillary central incisor

Tooth had 660nm laser placed for 2 minutes on partially avulsed left central incisor. This was repeated on day 4 and day 14 (4.4j)

Week two
Week six
17 months

Lawrence Kotlow DDS

Photobiomodulation (LLLT) in a Pediatric Dental Practice

TMJ pain & long appointments

- Mode 1, three minutes; 660 probe intraorally 1 minute

Lawrence Kotlow DDS
Viral & herpes like lesions

- Mode 3-one minute each cheek, intraorally 660nm probe 30 seconds on large lesions
- Parent said excellent relief that night
- 4 days later returned almost lesion free


Erbiuim Lasers and Pulp therapy

Kimura Y, Yonaga K, Yokoyama.


Henson T. Velez E. Clinical evaluation of pulp therapy using a dental lasers unit (an ongoing study clinical evaluation) San Antonio(TX) :Univ Texas Health Science Center at San Antonio; 2003-2007

Erbium:YAG Lasers

- Lasers are an effective alternative for treating pulps with the additional the benefits of providing pulp therapy without the need to introduce chemicals into children’s systems.

Pulp Therapy using the Erbium:YAG 2940 Laser

- The American Academy of Pediatric Dentistry defines a pulpotomy as when the coronal pulp is amputated, and the remaining vital radicular pulp tissue surface is treated with a medicament such as formocresol or ferric Sulfate or with electrocautery to preserve the radicular pulp’s health.
- Pediatric Dentistry Reference Manual: Guideline on Pulp Therapy for Primary and Young permanent Teeth
Elimination of chemicals

- It has been demonstrated that small amounts of formocresol may be absorbed and distributed throughout the child’s body within minutes of its use at the pulpotomy site.

Rational for treating vital and non-vital pulp exposures

- The objective of either procedure is to maintain the tooth or teeth involved functionally and painlessly without pathology until the primary tooth (teeth) can normally be exfoliated.
  - A permanent tooth, until the tooth is adequately developed for the root canal completion.

Lasers studied for use as pulp therapy

- Studies using the Nd:YAG lasers have examined the potential benefits for pulp therapy and indicate that the laser can be used without any detrimental effects.
  - Nd: YAG lasers appear to be a successful alternative to formocresol in pulp therapy of primary teeth.

Carbon Dioxide lasers have also been shown to be effective in treating pulpal tissue without creating damage in the radicular portion of the pulp.

Posterior and anterior pulpotomy

Pulpectomy

- Pulpectomy is defined as a root canal procedure for pulp tissue that is irreversibly infected or necrotic due to caries or trauma.
Posterior pulpotomy w EZ-PEDO ceramic crowns

Evaluation of patient treatments completed over a 5 year period. (4000 teeth)

- Seeing children by age 1 year hopefully will prevent most pulpotomies.
- Most primary posterior teeth which require pulpotomies, on average occur around 4-5 years of age.
- Most of these teeth will exfoliate or require removal at 10-11 years of age.
- Keeping a tooth for 5 years would be an excellent result in most instances.

Examples of successful treatment
Erbium:YAG laser pulpotomies

Erbium:YAG laser pulpotomies

Additional pulp therapy

Pulp Therapy
Post 5 years Pulp therapy

8/30/2002
10/30/2007
5 years
2 months

8/30/2002
10/30/2007
5 years
2 months

Five years of Pulp Therapy

9/3/2002
10/23/2007
5 years +

9/3/2002
10/6/2006
10/23/2007

Infected non-vital primary teeth (Lares PowerLase)

9/30/2002
3/27/2008
5 years
6 months

9/30/2002
3/27/2008
5 years
6 months

Initial lesions
2 months post treatment

Patient treated with amoxicillin 250/cc for 10 days
tooth lazed for approximately 30 seconds using Er:YAG
at 20 Hz and 80mj with water. Tooth stable and asymptomatic.
No signs of recurrent infection at this time. New bone formation.

Lawrence Kotlow DDS 2012

Deep second or third degree burn day 3-7 using laser since day 3

Day 1 of 1st treatment
Day 2 view after 1st treatment
Day: 3 view after 2nd treatment
Day: 4 view after 3rd treatment
Day 5 view 72 hrs & 4th treatment
Day 6 view 72 hrs & 4th treatment
Day 7 view 72 hrs & 4th treatment
Day 8 view 72 hrs & 4th treatment
Day 9 view 72 hrs & 4th treatment
Day 10 view 72 hrs & 4th treatment
Day 11 view 72 hrs & 4th treatment
Day 12 view 72 hrs & 4th treatment
Day 13 view 72 hrs & 4th treatment
Day 14 view 72 hrs & 4th treatment
Day 15 view 72 hrs & 4th treatment
Day 16 view 72 hrs & 4th treatment
Day 17 view 72 hrs & 4th treatment
Day 18 view 72 hrs & 4th treatment

Q1000 Photobiostimulating Laser  Approx. 1 J/min  3 minutes

Lawrence Kotlow DDS 2009
Q1000 Photobiostimulating Laser  Approx 4 J/min  3 minutes

Lawrence Kotlow DDS 2009

5 weeks post burn  1 year post burn

1.5 months  10 months  2.5 months

Lawrence Kotlow DDS

Cooking-oil burn 12 2009

12/28/09  12/30/09  1/4/10

1/4/10  2/8/2010
q1000 mode 1 and medx mode a

Lawrence Kotlow DDS

Thank you for your interest and time today

Lawrence Kotlow DDS 2013