Low-Level Lasers: An Opioid Crisis Solution

Gerald Ross
Welcome to the Greater New York Dental Meeting

Greater New York Dental Meeting™
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Sponsored by New York County & Second District Dental Societies

All programs and exhibits are held at the Jacob K. Javits Convention Center (unless otherwise indicated)
11th Avenue between 34th and 39th Street, New York City

General Registration Hours
Friday, November 29 12:00 Noon-4:30 P.M.
Saturday, November 30 8:00 A.M.-4:30 P.M.
Sunday, December 1 - Tuesday, December 3 8:00 A.M.-5:30 P.M.
Wednesday, December 4 8:00 A.M.-4:30 P.M.

Exhibit Hall Hours
Sunday, December 1 - Tuesday, December 3 9:30 A.M.-5:30 P.M.
Wednesday, December 4 9:30 A.M.-5:00 P.M.

COURSE REGISTRATION
Pre-registration is required for all continuing education courses with the exception of the “Live” Dentistry and Affiliated Groups. Your seat will be held for 15 minutes after the start of the course; after that, those without tickets will be seated according to space availability. When the room is filled, no additional people will be admitted due to fire department regulations. If you have not pre-registered, please be prepared to select an alternate session to attend.

Tickets
Tickets are required for all courses excluding Live Dentistry. Tickets for all functions can be purchased at all general registration booths located in the Registration Area on the Upper Level in the Crystal Palace and online.

6 Days of Education Seminars, Hands-on Workshops & Essays
Friday - Wednesday
4 Days of Exhibits
Sunday - Wednesday

FREE “Live” Dentistry
Hi-Tech 450 Seat Arena

SUNDAY
9:45 - 11:45
VOCO America, Inc. Drs. Ron Kaminer & Marc Geissberger
Restorative

MONDAY
9:45 - 11:45
Shofu
Dr. Ron Kaminer
Restorative

1:30 - 2:45
First Fit
Drs. Frederick E. Solomon
Cyrus Tahmasebi
Digital

3:30 - 5:15
Align I Invisalign I Itero
Dr. Sundeep Rawal
Digital

TUESDAY
9:45 - 12:00
Millennium
Dr. Sunil D. Thanik
Laser

2:00 - 4:15
GlideWell
Dr. Justin Chi
Digital

WEDNESDAY
9:45 - 12:00
Apa / CareCredit
Drs. Michael Apa
Aesthetic

2:00 - 4:15
Benco / Vatech
Dr. Aeklayya Panjali
Implant

John Quiñones
Monday, December 2nd
12:00 - 2:00 - Ticket 4010
$125.00

Celebrity Luncheon Speaker

3D Printing & Digital Dentistry Conference
Dental Laboratory
Technicians Programs
Sleep Apnea Symposium
Oral Cancer Symposium

WORLD IMPLANT EXPO

5th Annual Global Orthodontic Conference
3rd Annual Pediatric Dentistry Summit
12th Annual INVISALIGN® - GNYDM EXPO
4 Days of Programming:
Sunday - Wednesday
Botox and Facial Fillers
Seminar & Workshop
Over 1,700 Exhibit Booths
Clinical Application Guide
Dental Guide

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Guide for Application of Laser at Apex of Tooth

Apply the laser to each position indicated by the arrows
- On the upper molars, apply the laser once to each of the buccal roots and once to the palatal root
- On the lower molars, apply once to each of the two lingual roots (very softly)
- On the bicuspid, once to the buccal root and once to lingual root
- On the incisors, once to the buccal root

Post-Extraction
Effects of phototherapy:
- Reduction of post-op pain
- Reduced need for analgesics
- Increased circulation to get faster healing
- Reduced post-op edema
- Better bone formation
- Reduced probability of dry socket
Dose:
- **8J/cm²** into tooth socket More difficult Surgical or Impaction **16J/cm²**
  - In a multi-rooted tooth, if applying post-surgically where have done bone removal – 8J/cm² into each root
  - If infection 4J/cm² to submandibular lymphatics on infected side
- After suturing – **2J/cm²** overlapping along suture line

Treatment Tips:
**May precondition site before surgery 4J**

**Dry Socket**

**Effects of Phototherapy:**
- Significant reduction of pain
- Stimulation of fibroblasts for the production of an epithelial layer in the socket

**Dose:**
- Apply laser into socket until pain LESSENS – **16-100J**
- Apply medicated dressing
- Every appointment after, apply **4J into socket** before applying new dressing

**Treatment Tip:**
- Never exceed 4J when applying laser to socket during dressing changes (fibroblasts are inhibited at a dose higher than 5J and they are key for the production of the epithelial layer)

**Dental Infection:**

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

**Dose:**
- Submandibular lymph nodes – **4J/cm²**
Treatment Tip:
- The use of laser does not preclude use of antibiotics and will, in fact, stimulate the effect of the antibiotic 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

Soft Tissue Lesions
*Herpes Lesions, Erosive Lichen Planus, Aphthous Ulcers and Denture Sores*

Effects of phototherapy:
- Reduction in pain
- Prevention of lesion if caught in early stages
- Faster healing
- Decreased recurrence

Dose:
- Treat submandibular lymph nodes – 4J/cm²
- If light tip can cover the whole lesion – 4J/cm²
- If lesion larger than tip – 2J/cm² overlapping to cover whole lesion (so no tissue receives more than 4J/cm² of energy in total) as per diagram below
• Bruising after Injection – 4J/cm² at site of Bruising

**Treatment Tip:**
- Apply in light contact or just slightly away from sore
- When treating angular chelitis, be sure to identify the cause of the lesion to prevent recurrence

**Restorative**

**Effects of phototherapy:**
- Analgesia for small tooth preparations and crown cementations reducing use of local anesthetic in these cases
- Reduction of post-op sensitivity
- Faster uptake and elimination of anesthesia
- Production of secondary dentin in deep restorative situations

**Primary Teeth Restorations**

Apply the laser to the apex of each position indicated by the arrows
On the upper E, apply to MB, DB and L
On the lower E, apply to MB, ML, DB, DL
On the upper and lower D’s, apply B and L
On the upper and lower A, B, and C’s, apply to B

**Dose:**
- 8-32J/cm² at apex of tooth as per diagram above
- Following application at apex
  - If open caries, apply over the caries with water based gel
  - If no caries, apply to CEJ on B with water based gel
- During deep restorations
  - 8-32J/cm² inside tooth to reduce pulp hyperemia and post-op pain

**Treatment Tips**
- Check x-rays as apex of root much higher up than in adult teeth
- For a water based gel, Glumma or G5 work the best
- With your hand-piece, a light feather touch is key to success

**Cementing Crowns**
Dose:
- 16J-32J/cm² at apex (see diagram on page 1)
  - Remove temporary crown and then, with water based gel that is applied to the tip of the laser, apply 8J/cm² to the buccal, occlusal and lingual surfaces

Anesthetics
Effects of Phototherapy:
- Faster uptake of anesthesia
- Faster elimination of anesthesia

Dose:
- Apply to Submandibular lymph nodes – 4J/cm²
- Apply to site of injection – 4J/cm²

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 whom have received anesthetic as it will decrease the probability of biting tongues and lips

Nausea and Gagging
Effects of Phototherapy:
- Decreased nausea and gagging

Dose:
- Apply to P6 acupuncture point on the wrist – 8J/cm²

Treatment Tip:
- The P6 point is located on the undersurface of the wrist, approximately 1cm from the wrist crease
- If your patient suffers from anxiety or is a very strong gagger, apply 8J/cm² to all three points

Endodontics
Effects of phototherapy:
- Reduction of post-op pain and inflammation
- Reduced need for post-op analgesics

Following Root Canal Treatment
Dose:
- 8J/cm² at apex (refer to figure on page 1)
Treatment Tip:
- When placing at apex, you must look at radiograph to see the curve of roots. Often in the upper-first molars the D root is over the mesial of the second molar, and the mesial root is often over the distal root of the first molar

Pulpotomies
Dose:
- $4J/cm^2$ into pulp after cauterization completed

Treatment Tip:
- See notes on analgesia of primary teeth as to where to place at apices of primary teeth

Emergency Appointment with Infection
Dose:
- Apply at submandibular lymph gland to stimulate immune system and reduce pain – $4J/cm^2$
- If medication placed into tooth – $8J/cm^2$ at apex of each root

Endodontic Surgery
Dose:
- $8J/cm^2$ into bone before flap closed
- $2J/cm^2$ overlapping along suture line (see diagram below)

Treatment Tip:
- If possible, bring patient back 2x per week for 2 weeks to irradiate bone using $4J/cm^2$ over the site of surgery

Diagnosis of Hyperemic Teeth
- The patient can often not tell which tooth is causing the pain and you may not see anything on the x-ray
- Place the laser at the apex of the teeth starting with the tooth you feel is most likely the culprit– $8J/cm^2$
  - o if the patient starts to feel an intensification of pain, stop as this the tooth that is causing the problem
  - o if the patient feels nothing, go to the next tooth
When the tooth is identified...
- Take the laser away for 1 minute and then reapply – $8J/cm^2$
If you can leave it on for full $8J/cm^2$, then treat the tooth with conservative measures.

- If the pain comes back immediately, stop. This indicates that it is an irreversible pulpitis and a pulpectomy should be performed.

<table>
<thead>
<tr>
<th>Endo Diagnosis</th>
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<tbody>
<tr>
<td>Apply laser to apex of sore tooth</td>
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</tbody>
</table>

**Tooth non-vital**
- Laser will not have any effect and there will be no pain felt by patient (nerve is dead)

**Hyperemic Tooth**
- Pain caused by substance P, bradykinins, etc.
- Wait 1 minute for laser to increase circulation and lymphatic drainage
- Apply Laser to Identified Tooth

**No Pain**
- Indicates tooth can be treated with conservative methods

**Immediate Pain**
- Indicates case of irreversible pulpitis and will require a root canal

### Treatment Tip:
- This diagnosis is only possible if the tooth is vital
- If no tooth is found, palpitate the TMJ, Lateral Pterygoid muscle and masseter muscle on the pain side as these muscles can also refer pain into the teeth

### Dentine Hypersensitivity

#### Effect of Laser:
- Reduce conduction of c-fibres, which carry pulpal pain
- Stimulate β-endorphins
- Reduce inflammation
- Speed healing

#### Dose:
- $8J/cm^2$ at apex of each tooth
  - the reduction in the conduction of c-fibres and stimulation of endorphins will enable you to work at CEJ
- $8J/cm^2$ to buccal CEJ using a water-based gel (ie Glumma) on the tip of the laser
  - this is the main desensitizing force for long-term treatment to improve results, apply a primer and bond as well
Treatment Tips:
- Desensitizing can be done by assistant in second room (dentist just needs to come in for 1-2 min to apply primer and bond)
- Depending on patients habits, it may be permanent or may need to be repeated in a year
- If abfraction (from grinding) or patient experiencing ongoing recession, make a bruxism night guard in addition to desensitizing
- Use desensitizing code

Orthodontics
Effect of Phototherapy:
- Reduces intensity of pain
- Increases speed of tooth movement because of stimulation of osteoblasts

Dose:
- Following each of first monthly appointments, the dental assistant should apply the laser in each inter-proximal space halfway between CEJ and apex – 4J/cm²
  - For an adult or a very sensitive patient, suggest doing a second application 2 days later for first two monthly appointments
- For all future appointments, the laser should be applied to the teeth where forces are applied – 4J/cm²
- If muscle pain in jaw, treat as necessary – 8J/cm²
- If extraction done where teeth are being moved, apply into space – 4J/cm²
  - This technique will reduce the pain of treatment as well as shorten the length of treatment time
- In case of fixed palatal expansion, the laser should be placed along midline suture at every check appointment
  - Following the expansion, place weekly along suture for 3 weeks to stimulate the osteoblasts and have the suture space fill in quicker

Implants
Effects of phototherapy:
- Reduction of pain after surgery
- Faster integration of implant

Dose:
- After implant site is prepared – 8J/cm² into bone
- After suturing – 2J/cm² overlapping along flap

Treatment Tip:
- To stimulate osteoblasts ideally, treat buccal and lingual every other day for two weeks or stimulate extra-orally with home unit
Sinusitis

Effects of phototherapy:
➢ The laser can help to drain the sinus and reduce the pain of sinusitis.

Dose:
- Apply to Submandibular lymph nodes – 4J/cm²
- Apply along the base of the zygomatic arch either intra-orally or extra-orally – 8J/cm²
- Apply along the ethmoid sinus at the base of the forehead above the eyes – 8J/cm²

Treatment Tip:
- Wear safety glasses and be careful not to shine the laser light into the eyes

Nerve Regeneration

Effect of Laser:
➢ Return of sensation after traumatic damage or severing of a nerve

Dose:
- IEn case of trauma to inferior alveolar nerve, try to apply to site of trauma – 4J/cm²
- Apply to mental foramen – 4J/cm²
- Along path of nerve on buccal side from mental foramen to midline – 4J/cm²
- At the side of the mandibular block – 8J/cm² (as need to penetrate deeper)
  o To reach, apply from 2 places; styloid region under ear & behind zygomatic arch angled up (see diagrams C & D on page 7) or intraorally to foramen ovale

Treatment Tip:
- Apply 2-3 times weekly
- May take up to 20 sessions
- When patient feels tingling or burning of nerve, stop laser treatment and monitor progress
- Charge under acute muscle/nerve billing fee
- Treatment can be complex so if you have any questions about treatment applications, please contact Dr. Gerry Ross (905.936.4663-ddsross@rogers.com)

Following Long Dental Appointments

May use either the laser moving or a cluster unit

Dose: Use 8J/cm² on the following
- If using Laser, apply to the Lateral Pterygoid (diagram d, pg 11) and areas of the masseter muscle
  OR
- Have the assistant apply SLD Clusters in the operatory
  OR
- If using clusters or home unit,
Apply superiorly, cover the top of the masseter being sure it goes over the TM Joint (this ensures you are treating the joint and the lateral pterygoid)
Treat the lower part of the masseter with the bottom of the pads along the lower border of the mandible

**TMJ Protocols**
- First treat the lymphatic system – 4J/cm²
  - If the condition is long standing, during the first several appointments, treat the thoracic duct (at sternum between the first and second ribs) – if it is a female patient, be sure to have the husband or parent in the room, or to have it applied by a female
  - Then treat the submandibular lymphatic

**Temporomandibular Joint**
- 8J/cm² with the jaw closed to treat the lateral pole (see diagram A)
- 8J/cm² with the jaw open to treat the interior of the joint and the posterior structures of the joint (see diagram B)

**Styloid Process**
- 8J/cm² in the following positions
  - Under the ear, behind the middle of the Ramus and the angle of the jaw

**Treatment Tips**
- You are treating the joint capsule in the superior position and in all three positions, you are treating the styloid muscles and ligaments as well as the posterior digastric muscle (see diagram C)
- When you palpitate these areas, the area is often exquisitely tender to palpitation
- Also spasm in the sylopharangius muscles leads to the patients saying that they have difficulty swallowing as this muscle stabilizes the pharynx during swallowing

**Lateral Pterygoid**
- 8J/cm² behind the zygomatic arch
  - It is easiest to access this area with the jaw in the rest position (see diagram D)

**Acupuncture Points**
- 8J/cm² on following
Treat Li4 (see diagram E & F)

- If the muscles are hypertonic, treat the golden triangle to calm the muscles with the cluster probes (see diagram G & H)

A.  
B.  
C.  
D.  

Treat the following with SLD Clusters or laser to cover trigger points in muscle – BJ

- Temporals - Anterior and Posterior (see diagram A)
- Masseter – Superior and Inferior (see diagram B)
- Sternocleidomastoid – treat at sternal clavicular junction and anterior to mastoid area (see diagram C)
  - If there are any trigger points in the body of the muscle, these should be treated with the DioBeam or Oralase being careful to angle the beam away from the thyroid gland
- Trapezius – along the base of skull and trigger points in the muscle (see diagram D)

A.  
B.  
C.  
D.  

Treatment Protocols

- Treat the patient 2 times weekly in the office for 3 weeks
  - When treating chronic pain patients in-office or at home, alternate between pulsed and continuous treatments (first visit treat with continuous light, second visit with pulsed light, etc)
  - If they come from a long distance, have the patient treat themselves every other day for 3 weeks with the home unit, alternating BJ continuous and BJ pulsed (a rental fee of $69/week is charged and can be coded as one unit of acute muscle/nerve); it is advised to take VISA imprint in case the unit is not returned or is damaged
• Then do nothing for 2 weeks and reassess the patient

Hygiene Procedures

Scaling

Effect of phototherapy:
➢ Reduce root sensitivity during scaling procedure
➢ Pain reduction and stimulation of healing after major scaling

Dose:
• For areas where there is a lot of gingival swelling – 4J/cm² over areas to be scaled (apply before scaling)
• For analgesia during scaling – 8J/cm² at apex (refer to figure on page 1)
• After scaling with lots of pain - 8J/cm² over each quadrant

Treatment Tip:
• If gingival very swollen, treat Submandibular lymphatics before procedure – 4J/cm²

Root Sensitivity

Effects of Phototherapy:
➢ Decrease root sensitivity
➢ Stimulation of β-endorphins
➢ Reduction of the conduction of c-fibers (carry pulpal pain)
➢ Tissue biostimulation

Dose:
• 8J/cm² at apex according to diagram (page 1)
  ○ this will give analgesia to allow for treatment at CEJ
• Apply to CEJ or exposed sensitive root surface – 8J/cm²
• After apply laser, desensitize with Glumma or G5
Treatment Tip:
- Use a water based gel on tip of laser when applying to CEJ (e.g. Glumma or G5)

Periodontal Abscess
Effects of Phototherapy:
- Increased lymphatic flow
- Stimulation of wound healing

Dose:
- Apply the laser to the submandibular lymph nodes – 4J/cm²
  - Decrease swelling
  - Stimulates immune system
- After the procedure is completed – 8J/cm² on bone

Treatment Tip:
- Still use antibiotics where indicated

Notes on Using the Appropriate Dose
Treatment dose is probably the most important variable in laser treatment. Dose is measured in joules per square centimeter (J/cm²) and is a measure of the amount of energy that is conducted into the tissue. Clinicians should be aware of the optimal dose for each application to maximize the beneficial effects of laser therapy. Clinical effects of laser, such as wound healing, pain relief or muscle relaxation, are all sensitive to different irradiances or doses. The laser has a 1mm tip so where Joules given in guide it is J/cm²

The biostimulatory and inhibitory effects of lasers are governed by the Arndt-Schultz Law, which indicates that weak stimuli will increase physiological processes and a strong stimuli will abolish physiological activity.

Arndt-Schultz Curve
For applications where you are looking for biostimulation (e.g. stimulation of fibroblasts or osteoblasts for healing), use a lower dose (i.e. 2-4J/cm²). For applications where you are looking for bioinhibition (e.g. pain control), you want to use a higher dose (8J/cm²). In short, there is an optimal dose for each clinical application and one should be aware of this for ideal treatment outcomes.

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