

# wiser

COMPREHENSIVE

BROCHURE

THE DIODE LASER  
IN YOUR EVERYDAY  
PRACTICE





wiser

 DOCTOR  
**SMILE**  
INNOVATION HAS A NAME

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# WHAT IS A LASER

## LA LUCE LASER

The **LASER** (acronym of Light Amplification by the Stimulated Emission of Radiation) is a special instrument that can be applied in many different fields. Lasers have specific features that make them different from ordinary sources of light:

**MONOCHROMATIC:** a light bulb emits many different wavelength whereas a laser will emit photons at a single wavelength, so that its application is very specific and the interaction selective.

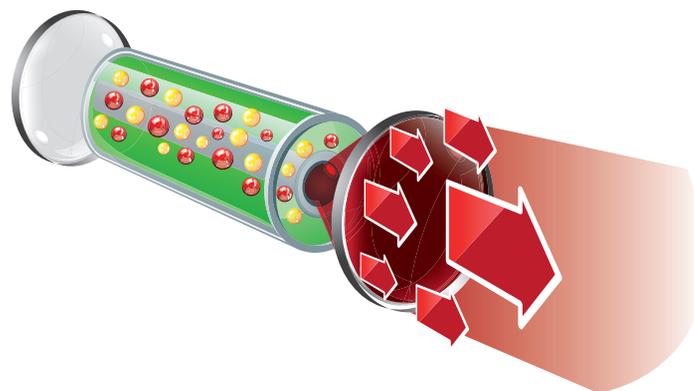
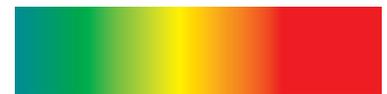
**COHERENT:** all photons in the laser beam travel with the same space and time undulation.

**POLARIZED:** all photons in the laser beam travel in the same direction.

*LASER LIGHT*



*ORDINARY LIGHT*



Compared to other sources of light, the laser is monochromatic, coherent and polarized.

## LASER COMPONENTS

To stimulate the emission of light with these characteristics, three elements are necessary:

### 1. An ACTIVE MATERIAL

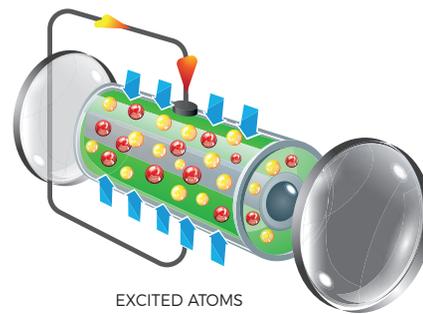
(the diode laser uses a diode semiconductor) capable of producing photons with a specific wavelength and increase their energy at each passage.

### 2. A SOURCE OF ENERGY,

such as a lamp or electricity, also known as optical pump, that can increase the energy of each photon so that stimulated emission may occur.

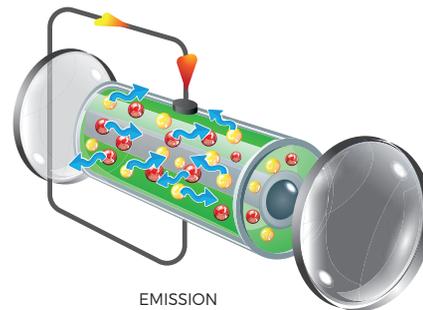
### 3. An OPTICAL CAVITY:

an arrangement of mirrors that can perfectly line up each electron until they reach the energy and coherence necessary to become a laser beam.



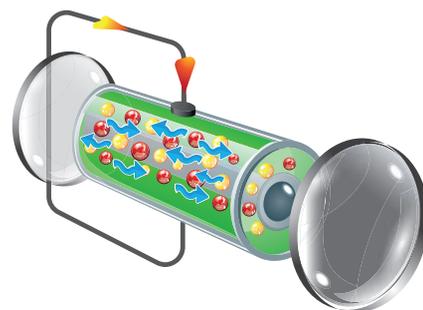
EXCITED ATOMS

1. The power source excites the atoms of the active material

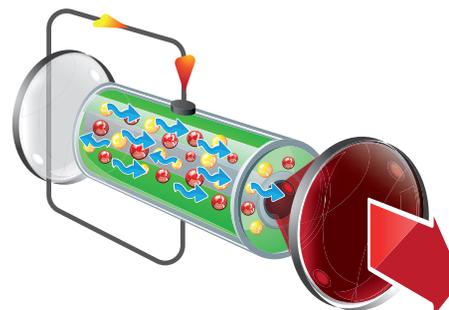


EMISSION

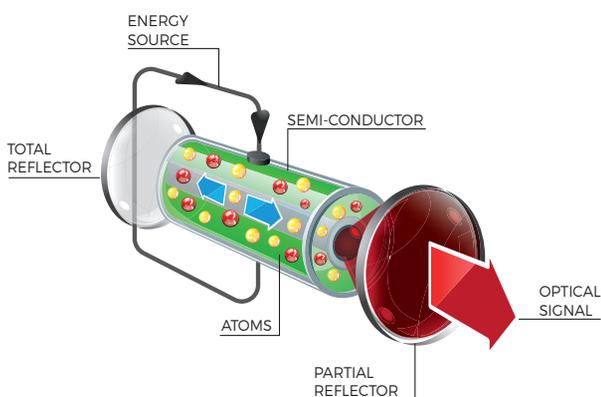
2. The material starts emitting photons in all directions



3. The optical cavity mirrors align the movement of the photons



4. The photons exit the optical cavity through the partially reflecting mirror with all the characteristics of a laser



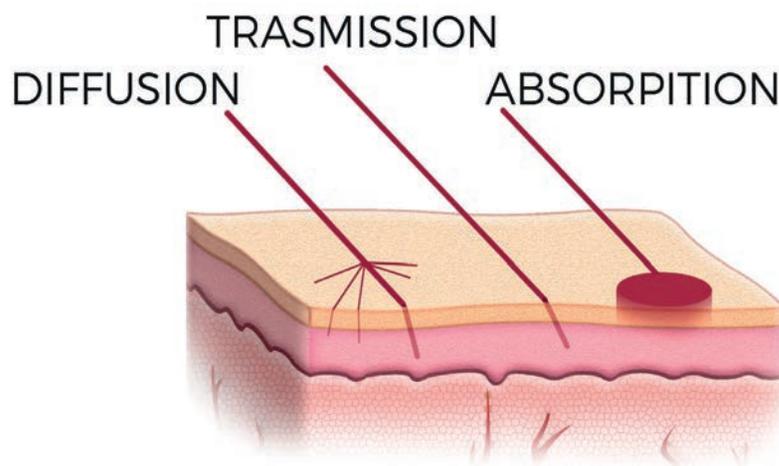
Components of the optical cavity of a laser

# LASER TISSUE-INTERACTION

## WHEN THE LASER INTERACTS WITH THE TISSUE

Biological tissue interacts with laser light mainly by absorbing its energy, but other important phenomena must be taken into account:

- **DIFFUSION:** energy will be dispersed in the tissue in the form of heat and will not contribute to the main effect of laser such as ablation or vaporization. It is important to evaluate its effects in the areas surrounding the point of application of the laser beam. With the diode laser diffusion of energy is predominant and generally involves the penetration of heat between 2 and 8 mm into the tissue.
- **TRASMISSION:** energy that passes through tissues without any interaction. It is important to evaluate the underlying presence of other materials that may instead absorb the laser beam.
- **ABSORPTION:** energy that induces a transformation of the tissue, mainly through its change into heat. Chromophores are materials capable of absorbing the energy of specific wavelengths. In the oral cavity water, hydroxyapatite, haemoglobin and melanin are the main elements that can absorb laser energy.



Since biological tissue is composed 80-90% by water, the absorption of the diode laser's wavelength is very effective on soft tissue: effective vaporization occurs with very little heat diffusion in the surrounding area. Also small blood vessels are perfectly coagulated.

The absorption of laser energy by a tissue depends on factors linked to the laser beam:

- wavelength
- laser emission mode (pulsed or continuous)
- time of exposure
- power density

and on factors linked to the tissue:

- degree of vascularization
- tissue tension
- presence of chromophores
- optical and thermal conductivity

#### PHOTO-THERMAL EFFECTS ON TISSUE ACCORDING TO THE TEMPERATURE REACHED:

40°-45°C	Vasodilatation and endothelial damage
50-60°C	Enzyme activity stops - protein denaturation. Collagen is more resistant. Increase in blood viscosity
80°C	Perivascular and intraparietal collagen shrinkage
100°C	Vaporization of interstitial and intracellular fluids
300°C	Ablation
>300°C	Carbonization

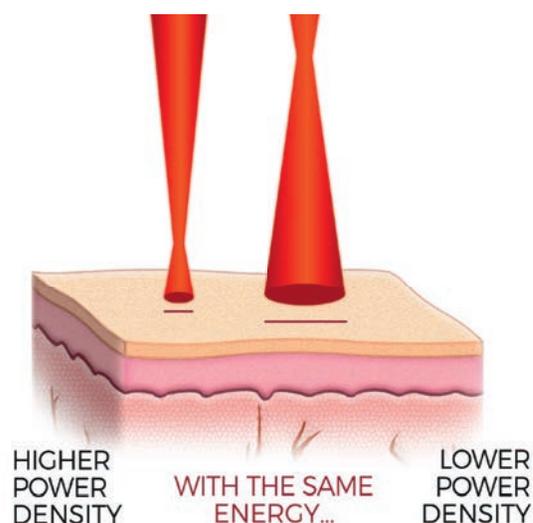
## VARIABLES

The main laser tissue interaction consists in the transformation of radiant energy into thermal energy. In order to obtain the desired effects on biological tissue, it is possible to increase or decrease the energy distribution by modifying these variables:

**POWER:** W (watt) - the total power of the laser beam can be increased or decreased.

**TIME:** exposure time to laser light for each treatment.

**POWER DENSITY:**  $W/cm^2$  - it is the amount of power of the laser beam, related to the area beamed by the laser. With the same power emission, as the size of the laser spot decreases, the power density increases. As the surface increases, the power density on that area will decrease. This will radically change the effect: with the same energy but with different power densities it is possible to cut, coagulate or biostimulate. When using a focused laser, it will be possible to concentrate all the energy in a small area. When a laser is unfocused, the irradiated surface is greater.



**EMISSION MODE:** laser emission can be continuous or pulsed. Continuous wave emission means that laser energy is delivered without interruptions. This mode is ideal for quick incisions and no bleeding.



Pulsed emission creates a succession of laser pulses separated by pauses. In the pulsed mode the average power emission is therefore lower than the peak power created by each pulse, proportionally to the ratio emission time  $T_{on}$ /pause  $T_{off}$ . The pulsed mode is not as fast in cutting procedures but it can avoid the charring of tissue, since it allows time for the tissue to cool off in between pulses. This cooling-off time is a very important aspect of what is referred to as **thermal relaxation time (trt)**.



**FREQUENCY:** Hz (Hertz) - measures the number of pulses per second. The combination of frequency and  $T_{on}$  -  $T_{off}$  values characterized the pulsed emission. This leads to two important clinical benefits:

1. During the  $T_{off}$  interval, the heat accumulated in the tissue can dissipate (thermal relaxation).
2. During micro-surgical procedure less anaesthetic will be necessary with following benefits for the patient.

## EFFECTS

By combining all of these variables several effects are achievable on the tissues:

**SURGICAL:** the laser can be an effective substitute of the scalp, by offering a precise and less invasive cut, without bleeding, with faster healing and avoiding sutures.

**HAEMOSTATIC:** the laser, thanks to its thermic effect, provides an instant haemostasis with following scarring and closing of the blood vessels.

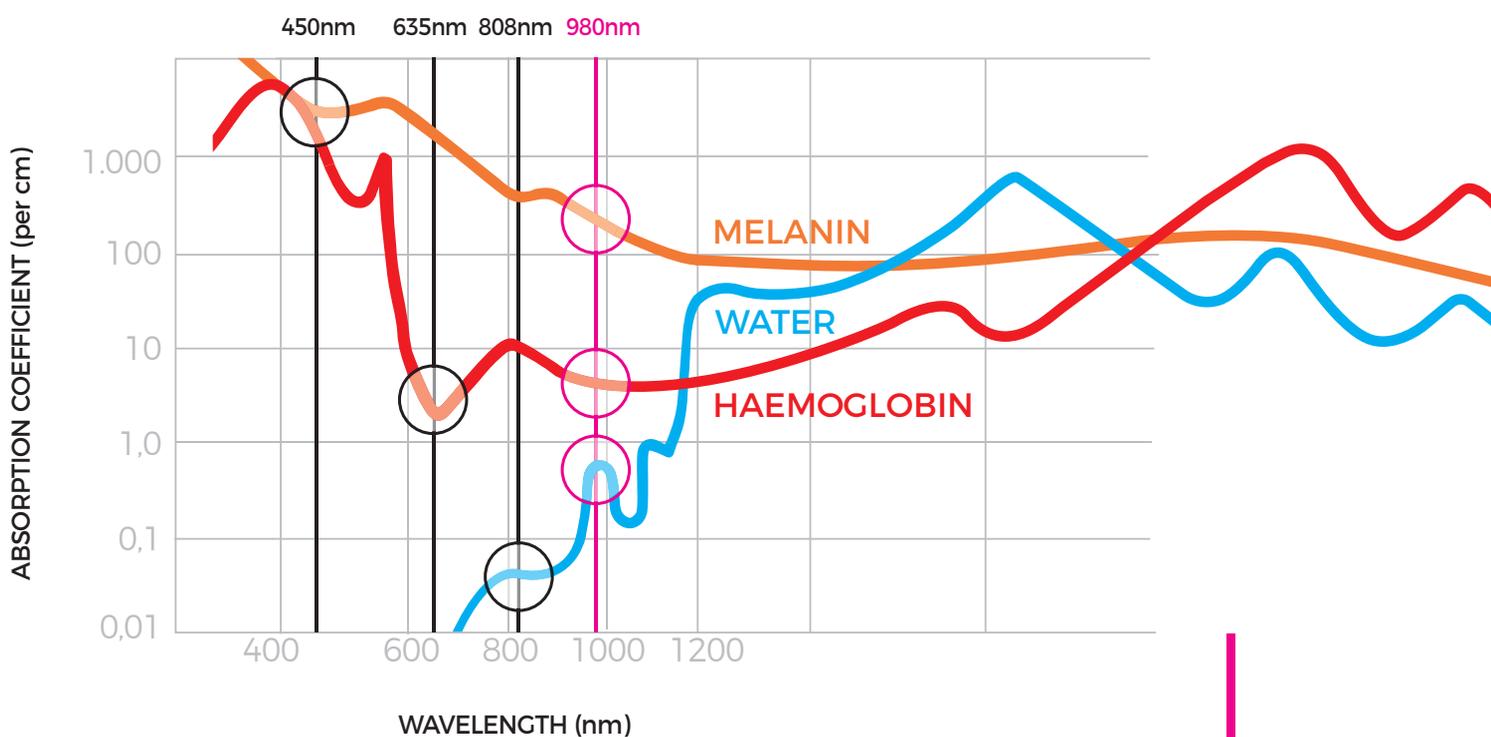
**DECONTAMINANT:** the laser beam is able to destroy the cell membrane of the bacteria, and it even more amplifies its effect if paired with irrigant solutions with a high concentration of oxygen.

**BIOSTIMULANT:** light has always been a source of energy. The laser through its effect on the tissues, is able to trigger the metabolic processes promoting the tissual regeneration.

**PHOTOABLATIVE:** the laser beam absorbed by the hard tissues like teeth and bone, may have an ablative effect in the selective removal of the caries and in bone surgery.

## WHY THE DIODE LASER

Soft tissues contain the three ideal chromophores recognized by the diode laser: haemoglobin, melanin and water. The three Wiser's wavelengths selectively interacts on each of these chromophores; the combination (also simultaneous) of these specific wavelengths allows a selective and wide-spectre action, useful in several oral cavity issues.



# FIBER ACTIVATION

## PROCEDURE

(according with Professor Wayne Selting)

In order to provide a correct soft tissue surgery, it is absolutely mandatory to activate the optic fiber. This simple procedure allows the dentist to perform a perfect surgical cut or a soft tissue ablation; unleashing laser energy in a more superficial and radial way on the interested tissue.

### Wiser laser's fiber activation tutorial

- Insert a green ring tip on the top of the handpiece and fix it with the relative metal ferrule
- Fold the tip until the desired angle using the suitable tip folder accessory
- Reducing the firing power to 0.4W using the buttons next to the power indicator
- Get a blue or black articulation paper (better if thin)
- Activate the laser emission by pushing the firing button for two consecutive times, until it becomes red
- Lay the top of the tip on the paper, pushing the footswitch only when the tip touches the surface and releasing the pedal after 1-2 seconds. Repeat the procedure for a minimum of 10 times until a maximum of 20
- The top of the tip is now black, sign of a correct activation of the fiber



During some treatments might be necessary to repeat the activation procedure.

# TIPS

Practical and easily changeable tips which are directly applied on the handpiece, they come with different colour and diameter according to the treatment they have been designed for. Moreover they are autoclavable for the highest hygiene.

## TIP IMPLANTS

Suitable for the implants decontamination.

- White ring Tip Ø 300 µm | length 8 mm

## TIP THERAPY

Suitable for the treatment of aphtas, herpes, cheilitis, etc.

- Black ring Tip Ø 400 µm | length 5 mm

## TIP PERIODONTICS

Suitable for the decontamination of periodontal pockets.

- Yellow ring Tip Ø 400 µm | length 10 mm

## TIP SURGERY

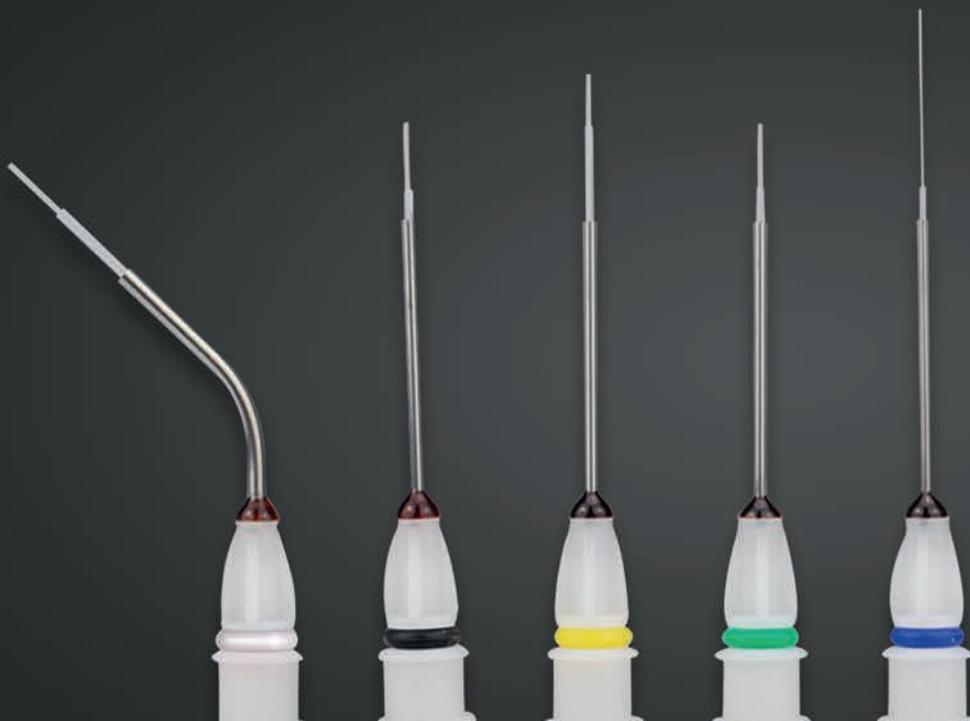
Suitable for gum surgery.

- Green ring Tip Ø 300 µm | length 5 mm

## TIP ENDODONTICS

Suitable for the decontamination of the root canals.

- Blue ring Tip Ø 200 µm | length 15 mm



# APPLICATIONS

## ENDODONTICS

ROOT DECONTAMINATION | PULP CAPPING | APICECTOMY

## PERIODONTICS

GUM ANALGESIA | POCKET DECONTAMINATION  
GUM BIOSTIMULATION | GUM RECESSION

## SURGERY

GRANULOTIC TISSUE, NORMAL TISSUE AND FIBROTIC TISSUE | COAGULATION | ABSCESS  
SULCUS PREPARATION | GINGIVECTOMY | FRENECTOMY | GRANULOMA | FIBROMA | HYPERPLASIA | FISTULA

## IMPLANTS

EXPOSURE | PERIMPLANTITIS -  
BIOSTIMULATION | ALVEOLUS DECONTAMINATION

## THERAPY

HERPES SIMPLEX | APHTAE | CHEILITIS ANGLE | HYPERSENSITIVITY | TRISMUS TMJ | BIOSTIMULATION  
FLAT TOP HANDPIECE | LASER ANALGESIA

## CONSERVATIVE

SEALING GROOVES | CAVITY DECONTAMINATION

## COSMETIC

WHITENING | GUMMY SMILE | HAEMANGIOMA | DEPIGMENTATION

## DERMATOLOGY

DERMATOLOGICAL SURGERY | SKIN DEPIGMENTATION | SKIN BIOREGENERATION



# ENDODONTICS



ROOT DECONTAMINATION | PULP CAPPING | APICECTOMY

## ROOT DECONTAMINATION

The goal of the endodontic treatment is to remove completely the infected tissue, in order to eliminate the most of the bacteria present inside the root canal. The bactericide effect of the laser is effective in the root canal, in the apical delta and in the dentinal tubules up to 500nm deepness, favoring the periapical lesions healing in briefer time compared to the traditional treatments.



## PULP CAPPING

### PULPECTOMY

A pulpectomy is necessary when the pulp is irreversibly compromised. Conventional treatment requires a complete pulp removal and canal boring. Then the root canal can be closed with guttapercha, and the cavity filled. With the laser the canals will be completely decontaminated in their entire length; haemostasis of the residual pulp fibres of the main and lateral canals will occur and the canal walls will strengthen. Compared to the conventional method the canal will be cleaner, without organic residue, with a better adhesion of the canal filling.

### PULPOTOMY

Pulpotomy is a partial pulpectomy in which only the pulp chamber is removed. The patient may feel sensitivity to heat, cold and sweets. Pain is usually greater when lying down and it is often difficult to identify the affected tooth. Such a situation may evolve in the complete loss of the pulp, ending in a granuloma or abscess. The removal of the pulp with a laser assisted canal therapy is much less painful and predictable in its result: all bacteria are eliminated and a drug therapy may not be necessary. The haemostatic effect of the laser speeds up the drying of the pulp chamber.

## APICOECTOMY

An apicoectomy is indicated when there is an obstruction of the canal, be it natural or artificial. In the presence of a granuloma and an obstructed canal this minor surgical procedure is carried out, even though it is invasive and debilitating (the tooth will lose length and strength). The apicoectomy treatment is performed due to the complications in case of a tooth with necrotic pulp, abscess and granulomas, but only when the endodontic treatment or retreatment (orthograde) cannot be provided. It consists in the surgical removal of the apex and the surrounding infected tissues affected by pathological issues. The apex of the root and the surrounding infected tissues must be removed, since it is not possible for it to heal spontaneously or with a drug therapy. The bactericidal properties of the laser are therefore indicated during this type of surgery.



The laser in the different phases of the root decontamination. Images by Prof. Nunzio Tempesta

# CLINICAL INFO

## LASER ASSISTED ENDODONTICS

Apical and lateral lesion of  
endodontic origin involving the 4.3

Patient:

Age: 55.

Gender: female.

General history: extensive radiolucent apical and lateral lesion of endodontic origin involving the third tooth of the lower right hemiarch.

Case history: the therapy provides the Endodontic Treatment of the 4,3 by using the L.A.I. (Laser Activated Irrigation) technique as an aid in the root decontamination.

Case treated by

Dr Francesco Maria Manconi  
Genoa



"Focus on: Laser Assisted Endodontic  
Decontamination with 980nm Diode laser".

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Cleaning and shaping of the root canals, through rotating tools and NiTi reciprocating.	The root canal shaping allows to the canal irrigants to erly achieve the third apical. If correctly performed, it facilitates the closing of the root canal system.	The endodontic therapy usually takes long time and long performance time, above all in case of tough anatomies and multi roots dental elements.
Laser	L.A.I. technique.	The L.A.I. technique its a method which implements the chemical decontamination (sodium hypochlorite) with the physical decontamination (diode laser) turning it more effective.	None.

### Treatment:

Both the extended apical and the lateral lesion, before all calls for a proper biodimensional and eventually tridimensional radiographic analysis.



The double osteolytic lesion, of clear endodontic origin, it is treated with the traditional cleaning and shaping phases with a mixed manual-mechanic technique using the NiTi and steel tools.

Detailed follow-up of the healing at four months of both the apical and lateral lesions.



**Conclusions:** The L.A.I. technique is clinically effective not only in the percentqage of clinic healings and observed radiographies, but also in the higher speed they happen with. This is tru above all in the most difficult clinic situations, tooth affected by a second endodontic treatment.

# PERIODONTICS



GUM ANALGESIA | POCKET DECONTAMINATION  
GUM BIOSTIMULATION | GUM RECESSION

During the past ten years much focus has been placed on diode laser applications in periodontics and its application in oral hygiene protocols. Results confirm that this technique used in combination with conventional instruments leads to a greater success of the periodontal therapy.

Periodontitis is caused by the inflammation or infection of the periodontium, and may affect up to three out of five people. Once it is onset, it is very rare that it heals spontaneously.

Therefore a specialized dentist or hygienist must begin an adequate therapy to control and stop such disorder. Anaerobic gram-negative bacteria are the most common cause of chronic periodontitis in adults. The aim is to obtain good gingival health by repairing the alveolar bone and restoring the shape and function of the mucosa. Treatment begins by cleaning the surface of the roots and eliminating any infected material or concretion, to aid the growth of the healthy connective tissue. In this phase the laser is very helpful in the removal of concretions because it weakens the tooth- tartar bond thank to its photochemical effect.

## GUM ANALGESIA

When beginning a periodontal therapy, an initial passage with the laser is useful for its analgesic effects: laser energy inverts the sodium-potassium pump of the cellular membrane for 30 minutes. In this time it will be possible to operate with other instruments without provoking excessive pain in the patient.

## POCKET DECONTAMINATION

Thanks to its decontaminant effect, the diode laser allows us a fast decontamination of the gum pocket. The laser periodontal treatment is minimally invasive and well accepted by the patient. A normal pocket is about 2/3 mm. deep. The bacterial plaque that deposits in the pocket, if not treated, causes inflammation and destruction of this part, which to defend itself moves lower. The gum groove goes deeper, becoming a pathology called periodontal pocket. Here, plaque it is enriched with germs that survive also in absence of oxygen and causing damages to the structures on the root of the tooth. With the laser is easier and less invasive for the patient to going inside the pocket. The operation consists in the beaming of the area to be decontaminated eliminating germs and bacterias which have deposited inside the pocket and triggering a deinflammation of the treated surface. All of this without anesthesia. From 3 to 5 sessions will be needed in order to achieve a total decontamination and a complete closing of the pocket thanks to the laser's biostimulation effect. The treatment can be performed by professional dental hygienists due to the low power necessary.

## GUM BIOSTIMULATION

Another fundamental effect of the laser is its biostimulating effect. By defocalizing the laser beam with a specific handpiece, it is possible to irradiate tissue that has undergone surgery with sufficient energy to stimulate the metabolic process with consequent tissue regeneration.

## GUM RECESSION

In the case of gingival recession, the combined biostimulating and decontaminating effect will lead soft tissue to reacquire its physiologic shape, within a complete oral hygiene therapy.



The laser during the pocket decontamination, measurement of the pocket before and after the periodontal therapy.

Images by Prof. M. Roncati.

## CLINICAL INFO

# NON-SURGICAL PERIODONTAL APPROACH

### Patient:

The patient shows a generalized plate-induced inflammation, the abundant presence of calcified deposits justifies the extent of the inflammatory reaction. Upon the first examination, biometric periodontal indices are collected, including periodontal probing and bleeding index, which in this case was 94%. The probing depths, measured in the lingual zone, are slightly above the standard values, but also associated with particularly marked bleeding. The most critical zones appear associated with the maxillary molars, in both arches, with probing depths greater than 6 mm.

### Case treated by

Dr Marisa Roncati  
Ferrara



In the non-surgical periodontal therapy, traditional methods are integrated with laser therapy. Wiser therapy is painless and after a few applications bleeding, sensitivity, the probing depth and the symptomatology associated with periodontopathy disappear.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Periodontal instrumentation performed with ultrasound and manual instruments, and also surgical treatment to reduce the pocket by 7 mm.	Improvement of periodontal state, probing, and bleeding.	Surgical treatment: -Invasive -Long healing times -Poor patient adherence.
Laser	Periodontal instrumentation performed with ultrasonic instruments and manual instruments and Wiser therapy.	Improvement of periodontal state, probing, and bleeding. Patient comfort.	None.

### Treatment:

Periodontal instrumentation performed with a universal curette, using vertical movements. It is recommended to always dip the manual tool in 3% (10 vol) hydrogen peroxide solution.



The use of diode laser, used in conjunction with 3% (10 vol) hydrogen peroxide, for pocket decontamination both before and after non-surgical periodontal instrumentation.

A year after causal therapy and after the laser therapy, a probing depth of 2 mm is detected, and no bleeding.



One year later an X-ray examination confirms a condition of clinical stability.

**Conclusions:** After diagnosis of chronic periodontal disease, in a mild to moderate and severe localized form, the patient underwent two professional hygiene sessions, with the additional use of Wiser. The two appointments were scheduled within a week, a third session was set one month apart from the previous ones, after which the patient was monitored every three months for the first year. On the right maxillary molar, which had an initial probing depth of 7 mm associated with bleeding, the improvement achieved was so significant that the surgical treatment, which seemed to be indicated during the first visit, was no longer necessary immediately, after the reassessment of initial therapy. It is advisable to monitor the area over time to identify any relapses.

# CLINICAL INFO

## MICROINVASIVE NON-SURGICAL PERIODONTAL TREATMENT

### Case treated by

Dr Salvatore Russo  
Rome



At the first examination, patient showed a high sensitivity to cold in quadrant 1 area. The dentist, via an endoral examination highlighted a serious periodontal problem of element 1.6. During probing, the element showed a vestibular-distal and palatal-distal pocket of 7 mm with no bleeding and mobility. Following patient's refusal to undergo surgical periodontal treatment, an assisted diode laser therapy was proposed.

### Patient:

Age: 25.

Gender: female.

General history: good general health. Good oral hygiene. Hypersensitivity of element 1.6. Absence of spontaneous or induced bleeding. Absence of mobility.

Case history: the physical examination revealed an optimal state. An endoral examination revealed periodontal problems at element 1.6, confirmed by probing, with a periodontal pocket of 7 mm vestibular-distal and 7 mm palatal-distal.

Diagnosis: severe localized chronic periodontitis.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Periodontal treatment of surgical type.	Increased certainty of the prognosis (scientific evidence).	Poor patient adherence. Contraindicated in patients with special pathologies. High cost. Invasive. Long healing time.
Laser	Laser assisted non-surgical periodontal treatment.	High patient adherence. Minimally invasive. Biostimulation. Decontamination. No medication. No infiltrative anesthesia.	Poor and contradictory scientific bibliography.

### Treatment:

Scaling and root planing are followed by laser decontamination with Wiser 980nm and the use of hydrogen peroxide at 3% - 10 vol.



Photobiomodulation of the mucous membrane of element 16 with defocused tip.

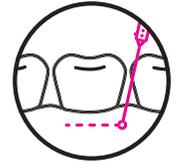
Check-up one week after treatment.



Probing 4 months after treatment.

**Conclusions:** So far, the topic “the aim of laser to complete conventional periodontal treatment” is a reason for discussion that splits the dentists into pros and cons groups. Diode laser, with its decontaminating, biostimulating, desensitizing functions, is in fact an interesting aid in SRP therapy. If used according to adequate protocols, it can boast additional benefits in the therapy of conventional non-surgical periodontal treatment, with safe benefits in the short term. The minimum invasiveness, the absence of side effects, the absence of post-operative drug therapy and infiltrative anesthesia translate in extremely high patient compliance when using diode laser.

# SURGERY



GRANULOTIC TISSUE, NORMAL TISSUE AND FIBROTIC TISSUE  
COAGULATION | ABSCESS | SULCUS PREPARATION | GINGIVECTOMY  
FRENECTOMY | GRANULOMA | FIBROMA | HYPERPLASIA | FISTULA

In the surgical field, the usage of laser is totally comparable to the common scalp, but with more effects like haemostasis, decontamination of the area, biostimulation and analgesia. With a proper knowledge of the laser characteristics it is possible using it in several situations, operating with bloodless field and excellent visibility. The hemostatic effect is remarkable, and it does not affect the surrounding tissue. The wavelength of the diode laser is easily absorbed by the dark elements like haemoglobin and melanin, beyond by the water present in the tissue, achieving a considerable cutting capacity.

The laser, rather than the cold blade of the scalp, offers different advantages

- the knife cuts precisely, but it doesn't have any bactericide or coagulant property;
- compared to the electro surgical knife, there is no muscular fasciculation, which creates tissual retraction;
- the outcome of the operation is predictable, in fact, during the healing process there is no tissual retraction;
- thanks to the antalgic and biostimulant effect, the laser reduces the usage of drugs and the healing recovery time.

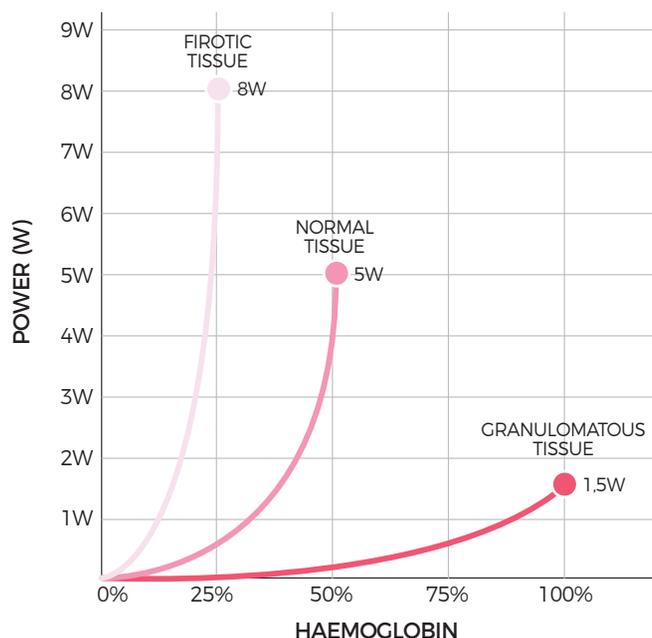
The distinctive characteristics of the diode laser used in surgery are:

- cut precision on soft tissue without affecting the hard ones like bone or teeth;
- the coagulant effect makes the treated area clean and bloodless, also in patients with coagulation issues or following anticoagulant therapies;
- less necessity of anesthetic;
- less traumas either in the treated tissues or in the surrounding ones;
- less post-operation pain;
- less post-surgery edema;
- absence of traction in healing tissues;
- better aesthetic of the tissues in the post-operation period;
- better recovery by second intention healing;
- less usage of drugs in the post-surgery periods.

Thanks to the absence of traction during the recovery, the laser becomes fundamental in the "reshaping" treatment of the oral soft tissue, where surgery would be mandatory in order to correctly positioning or removing part of tissue.

## GRANULOTIC TISSUE, NORMAL TISSUE AND FIBROTIC TISSUE

Not all types of soft tissue are the same. For this reason the TOP (Tissue Optimized Pulse) laser modulation system was developed. Specific protocols are available for each tissue type. Each treatment parameter - such as the power and pulse duration - has been calibrated in order to operate selectively and allowing right tissue relthe proper TRT (Thermal Relaxation Time). Each tissue reacts differently to the laser beam because of the different content on melanin and haemoglobin it contains. For example, fibrotic tissue that has scarce vascularization requires more energy for the ablation, but if the power is given in short pulses then it will be possible to avoid necrosis, because of the thermal relaxation time between one pulse and the other.



## COAGULATION

The haemostatic property of laser energy is a key feature for the control of haemorrhages during and post operation. The diode laser immediately causes tissue to heal over thus avoiding the onset of the bleeding that occurs with conventional instruments. When conventional instruments are needed, the laser can be used after cleaning the area and to remove the excess of blood by directly touching the wound. This property is therefore very useful whenever it is necessary to maintain a clear treated are, or when natural coagulation is slow and insufficient.

## ABSCCESS

A dental abscess is a localized collection of pus associated with a tooth. According to its position, there are two types of abscess: the most common one is the periapical abscess (when pus is present around the root apex) and the second one is the periodontal abscess (when pus is inside the periodontal tissue). Draining an abscess with a laser is much less painful than with conventional instruments. By lowering the energy, or applying a topical anaesthetic, pain can be controlled throughout the operation. Bleeding is minimal so drainage can be carried out without compression, while avoiding any build-up in the gauze. The laser's antiseptic property will prevent any post-op infection.

## SULCUS PREPARATION

Sulcus preparation is an extremely important phase of the creation of a prosthesis that should be long lasting and functional. The impression must be perfectly adherent to the natural dental and tissue shape of the patient's oral cavity.

The laser is used for this application to shape gingival tissue and mucosa, without interaction with the underlying bone structure of natural elements or implants, as well as for its haemostatic properties.



## GINGIVECTOMY

In a gingivectomy the gingival tissue is surgically removed at the epithelium in order to create a new gingival margin. This procedure is usually necessary to eliminate periodontal or gingival pockets, to access periodontal tissue that is not readily accessible, or to reach the inside of a pocket for tartar removal. The use of the laser means limiting trauma in patients because healing is favoured by tissue vaporization and no bleeding occurs. Anaesthesia may not be necessary. If the patient does feel pain a topic anaesthetic can be applied and a laser analgesia treatment carried out beforehand.

Images Prof. Frosecchi.



## FRENECTOMY

The frenulum of tongue is a small fold of mucous membrane extending from the floor of the mouth to the midline of the underside of the tongue (vestibular frenulum). A frenectomy will partially remove or relocate the frenulum in order to stabilize the position of teeth or alleviate the traction on the tongue. Usually it is carried out on young patients, and for this reason the laser is an ideal instrument. The patient will not feel pain but an anaesthetic gel can be applied on the frenulum. The lased tissue will instantly vaporize and no bleeding will occur, making it easier for the patient. Post op is simple and easy without the need for stitching.



Images Prof. N. Tempesta

## GRANULOMA

Granuloma is the outcome of an inflammation and following death of pulp inside the tooth. It consists in a mass of infected tissue of a few millimeters of diameter, with roundish shape and visible using the x rays on the apex of the root, often asymptomatic but sometimes painful during chewing.

The apical granuloma is a bacteric infection localized in the superior or inferior jaw. This infection appears like a dark area in radiography. Generally, the cause of this process is due to a decay of the tooth not treated in time, thus the bacterias are able to carry on towards the tooth nerve (pulp chamber). Once arrived at the nerve, they infect it and a pulpitis appear, which in the worst scenario can lead to an abscess or can become chronic determining the granuloma.

Granulomas are responsible for focal infections and dental abscesses. Clearly this infection determines an immune response by our organism, without possibility to defeat the infection. Bacterias in fact are inside the root of the tooth and from there they keep on dig on the bone through the apex of the tooth.

To decontaminate the area, the laser is the most apt tool: it can clean up eliminating the bacterias that dwell in the inner part of the tooth.

## FIBROMA

The laser can be used as a cutting instrument to remove parts of tissue or neoplasm, benign or malignant. A gingivectomy may later be necessary in some cases. According to the type a following gingivoplasty may occur.

Fibromas are generally present in the buccal plane and must be removed if they grow excessively or are annoying to the patient.

Epulis is a reactive parodontal tumor usually caused by bad oral hygiene. The removal of the epulis must be followed by an proper anti-inflammation therapy.



## HYPERPLASIA

This surgical procedure is often associated with a gingivectomy: excess of tissue is removed without bleeding and the gum is shaped into its correct periodontal morphology. With the diode laser it is possible to model the gingival profile to improve the overall aesthetics and to help the oral hygiene.

## FISTULA

A fistula is an abnormal opening in the gingival tissue through which an abscess can drain. The operation is performed through the intraluminal coagulation technique. By lasing the opening, internal and external coagulation begins the healing process and the area is decontaminated.

fistula - before



laser treatment



post



advanced healing

# CLINICAL INFO

## LINGUAL V APEX FIBROMA

Patient:

Age: 45.

Gender: female.

General history: nothing relevant.

Case history: the patient has a lesion on the V lingual apex from one year.

Diagnosis: lingual mucosa squamous cell papilloma.

Case treated by

Dr Nunzio Tempesta  
Terlizzi (BA)



The removal of a fibroma from the tongue with cold knife implies an abundant intraoperative bleeding and the use of sutures, with significant discomfort for the patient. Removal with Wiser avoids both problems.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Cold knife scalpel.	Relatively quick cutting.	Bleeding. Suture required. High risk of scar formation. Anesthetic infiltration.
Laser	Diode laser.	Cutting under complete hemostasis. No suture. Topical anesthesia (no infiltration). Healing without scarring. Rapid healing.	Small alteration in biopsy sample edge reading.

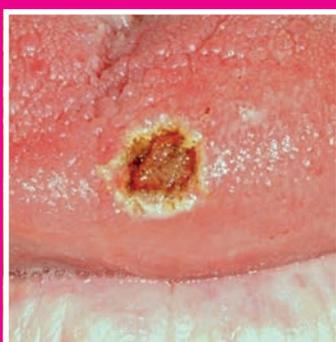
### Treatment:

After using a topical anesthetic, fibroma is removed with the activated Wiser fiber.



Removal with Wiser is the most suitable surgical method for anatomical areas prone to bleeding.

The use of Wiser also prevents the slightest bleeding and avoids the need for sutures with consequent scarring.



Healing happens by secondary intention.

**Conclusions:** Today, Wiser makes operations like this, which once led professionals to refer patients to the clinics due to the abundant bleeding of the tongue after the incision made with a scalpel, a routine practice. Wiser allows performing minimally invasive surgery, hemostasis and operational simplicity. The pathologist must report that the surgery was carried out with diode laser for the assessment of the edge changes.

# CLINICAL INFO

## UPPER LIP FRENULECTOMY

Patient:

Age: 50.

Gender: male.

General history: nothing relevant.

Case history: the patient shows up for a first examination complaining about gingival bleeding and sensitivity. In the mesial vestibular arches of elements 11 and 21, probing depth is 9 mm, a diastema between the two elements and a large upper labial frenulum that exerts a powerful traction force next to deep pockets.

### Case treated by

Dr Massimiliano Arlotta  
Dr. Fabio Sichel Turco  
Aversa (CE)



Non-surgical periodontal therapy with scaling and root planing is usually applied to simple cases, with probing depth below 5 mm. The synergic use of traditional instruments and diode laser can move this limit forward, allowing us to handle with open procedures cases.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Periodontal treatment of surgical type. Surgical frenulectomy.	Improvement of the periodontal condition, probing and bleeding. Rapid intervention.	Surgical treatment. Invasive. Long healing time.
Laser	Non-surgical periodontal treatment. Frenulectomy. Photobiomodulation with diode laser.	Haemostasis. Secondary intention healing. No sutures. Decontamination. Biostimulation. Improving of the periodontal state and probing outcome.	None.

### Treatment:

Upper lip frenulectomy with diode laser



Biostimulation with Flat Top handpiece.



State immediately after: open scaling and root planing, upper lip Frenulectomy with diode laser.



Five days after surgery, the second intention healing begun.



**Conclusions:** Only ten days after surgery, periodontal probing is performed with slight pressure. Mild tissue ischemia is obtained, only 3 mm in the vestibular mesial arch of the tooth 11, and only 2 mm in the vestibular mesial arch of tooth 21. The site subjected to frenulectomy shows advanced epithelization. In this case, laser's potential has been fully exploited. Decontaminating action in surgical periodontal therapy is possible, thanks to the photodynamic therapy. Surgical benefits, with haemostasis in frenectomy. Therapeutic benefits, the Flat Top handpiece accelerates healing by tissue photobiostimulation.

## CLINICAL INFO

# COMPLETE HEALING OF SOFT TISSUES, AFTER A LASER-ASSISTED SURGERY

Patient:

Age: 28.

Gender: female.

General history: negative medical history, an accurate clinical inspection reveals significant recessions on teeth 3.2, 3.1 and 4.1.

Case history: Multiple insertions frenulum "with a large implant base".

Case treated by

Dr Francesco Maria Manconi  
Genoa



"Focus on: faster healing of soft tissues, after a laser-assisted surgery made with diode laser".

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Initial preparation with a professional oral hygiene (SRP), cut made with the traditional scalpel that requires suture and its removal after several days.	None.	Immediate and, sometimes, belated bleeding, longer healing time, pain and less post operative comfort.
Laser	Initial preparation with a professional oral hygiene (SRP), cut done with Wiser, application of photobiostimulation is carried out, with the specific "Flat Top" handpiece.	Very successful both during and post operation, it respects the soft tissues and their dimensional ratio with bone tissue and teeth.	None.

### Treatment:

After one week, a topical anesthesia is performed and the cut is done with a 980nm diode laser (WISER - DoctorSmile Laser).



The soft tissues don't have any bleeding or signs of overheating. A photobiostimulation treatment is carried out using the specific "Flat Top" handpiece.

The patient is discharged without any suture, she only has to apply some chlorhexidine gel 0.20% for several days.



At 7 days control, the soft tissues are almost recovered following an optimal second intention healing, in absence of edema.

**Conclusions:** The clinical progression has been very comfortable because of lack of any bleeding, any suture, any pain thanks to both analgic and biostimulating effect of the laser light. It should be recalled that, everytime a soft tissue surgery is performed (even if it's made with the traditional scalpel), a photobiostimulation session is very well recommended in order to promote a faster healing.

# CLINICAL INFO

## FIBROMA

Patient:

Age: 45.

Gender: female.

General history: N/A.

Daily habits: N/A.

Oral hygiene: good.

### Case treated by

Dr Marco Moscato  
Rome



Patient affected by fibroma on the cheek mucosa. Typical lesion due to the "morsicatio oris" of occasional feedback but often present in several cases, by effect of wrong restorative dentistry (or occlusal parafunctions). Neoformations, often aged, which cause discomfort to the patient during the chewing. Thanks to the diode laser, this lesion can be faced quickly and with safety, without anesthesia or sutures.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Surgical exeresis in a professional practice.	Total removal of the mass.	Anesthesia, sutures and multiple sessions.
Laser	Diode laser treatment, green tip, power 1.5W, CW mode.	Fast treatment, painless, no sutures, fast healing.	None.

### Treatment:

Immediate post-operation.



Healing after 7 days.



**Conclusions:** Thanks to diode laser we're able to remove the neoformations in minutes and without infiltrative anesthesia. The patient will be discharged with the application of an aloe-based topic gel and without sutures. Yet after a few hours, the patient will be able to eat and drink without any discomfort, carrying on the healing which will be completed in 7 days.

# CLINICAL INFO

## ANGIOMA

Patient:

Age: 65.

Gender: female.

General history: diabetic patient not insuline addicted, hypertensive and under anti-hypertension treatment.

Case history: sessile neoformation, detected, diameter of about 5 mm, lobulated appearance and hard but elastic consistency, depth of at least 3 mm.

Diagnosis: formation which presents the angioma's characteristics, and responds positively to the confirmation test.

Case treated by

Dr Marco Moscato  
Rome



Angioma on the cheek mucosa, probably with traumatic origin and surely present for some time, since it is well developed in dimension and at the vascular level.



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Not treatable in a professional practice.	Removal in a specialized structure, in a single session.	Usage of sclerosing agents, anesthesia by infiltration, surgical removal with sutures. Localized discomfort for at least 7 days in the treated area.
Laser	Treatable in clinic by using diode laser in about 10 minutes. Power 4W.	Fast timing, neither anesthesia nor suture, no post-operative pain.	None.

### Treatment:

Diode laser in action, not in touch, optical fiber not initiated, brushing movement.



Diode laser with black tip, total power 4W, impulse CW.



Pic taken at the end of the session, the lesion is completely white now.



Pic 6 days after the treatment, the natural residual eschar is visible.



**Conclusions:** The removal of an angioma by using the diode laser, grants the patient a solution for a tough disease within minutes. The laser allows us to resolve common pathologies in a painless way, using therapies that otherwise would not be possible to be performed in the daily practice. Huge versatility, no pain, no anesthesia, post-operative discomfort and fast healing time.

## CLINICAL INFO

# TREATMENT OF LINGUAL FRENULUM

Patient:

Age: 9.

Gender: female.

General history: nothing relevant.

Case history: with typical ankyloglossia symptoms, difficult phonation of dento-linguo-labial consonants and lingual extrusion, presence of a median furrow in protrusion and impossibility of touching the palate with the tip of the tongue while opening the mouth.

### Case treated by

Dr Nunzio Tempesta  
Terlizzi (BA)



The short lingual frenulum is frequently dealt with in dental practice and the elective therapy is frenulectomy, in the cases where the clinical state requires it. The cold knife incision of the lingual frenulum would cause enormous bleeding. For this reason, it was decided to use Wisier that enables bleeding control while avoiding the final sutures.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Traditional surgery with scalpel and suture.	Rapid intervention.	Abundant bleeding. Haemostasis is difficult. Suturing is difficult.
Laser	Diode laser.	Haemostasis. Precision and maximum cutting control. No need for suture, healing by second intention without relapses. Decontamination and biostimulation for a faster healing.	Not detected.

### Treatment:

Removal of the frenulum using the laser handpiece with initiated fiber.



The use of diode laser allowed to obtain immediate haemostasis, with excellent visibility of the operating site with cutting precision.

The frenulum is completely eliminated according to the longitudinal and the perpendicular planes, in relation to its insertion.



The absence of sutures greatly reduces post-operative discomfort and healing times.

**Conclusions:** The total duration of laser-assisted frenulectomy is shorter than the scalpel surgery one, although the excision itself is much shorter in the second case. With diode laser we have a blood free surgery with excellent visibility, while with using cold knife, frequent padding and surgical aspiration of blood is required with an accurate final suture as well. In conclusion, we can state that lingual frenectomy treated with diode laser is a great therapeutic solution, with no postoperative complications which increases patients compliance.

## CLINICAL INFO

# CANINE OPERCULECTOMY

Patient:

Age: 12.

Gender: male.

General history: nothing relevant.

Case history: the patient is affected by disodontiasis of the upper-left canine. The radiological exam has highlighted the not-yet erupted and its vestibular position. The gingival tissue and the fibromucous in the area of the canine characteristics are clinically evaluated, then the hood through the use of diode laser is performed.

### Case treated by

Dr Nunzio Tempesta  
Terlizzi (BA)



In case of canine inclusion, the therapy to be performed is the surgical disinclusion followed by an orthodontic treatment in order to replace correctly the tooth. In this scenario, with Wiser it has been possible to complete the exposure through a simple and totally micro-invasive hood.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Traditional surgery.	None.	Anesthesia by infiltration. Bleeding. Sutures. Oedema. Pain.
Laser	Diode laser treatment.	Operative simplicity. Patient compliance. Absence of anesthesia by infiltration. Haemostasis. Minimal invasiveness. Absence of post-operative disease. Assured bracket adherence. Fast healing.	None.

### Treatment:

Before the diode laser treatment procede with a topic anesthesia, enough to perform the hood.



Exposure of the vestibular crown of the 2.3. The mucosa's incision with the diode laser assures cut precision and bleeding control.

In the same session procede by positioning the orthodontic bracket: diode laser is pivotal to manage the bleeding and for successfull adherence procedures.



**Conclusions:** After 14 months the canine has achieved its correct position in the arch, maintaining the gingival architecture. With diode laser the topical anesthesia is enough, no sutures or drugs are needed; it also reduces the stress of the operator and of the young patients. Diode laser simplifies the procedures, allows a perfect bleeding management which permits an excellent view of the treated area. Therefore it is correct to say that the usage of diode laser is important in the daily practice because it perfectly takes place in the modern minimal-invasive dentistry philosophy..

# IMPLANTS



## EXPOSURE | PERIMPLANTITIS - BIOSTIMULATION | ALVEOLUS DECONTAMINATION

The diode laser is helpful above all in case of perimucositis or peri-implantitis. It represents a tool useful in second intention healing and in the treatment of the typical implants issues in combination with guided regeneration techniques.

### EXPOSURE

Two-phases implants are often used in the treatment of patients. During the second surgery phase, it is recommended to evaluate if a large flap plastic operation would be needed in order to perform an increment of keratinized mucosa. In this case, the laser can be successfully used for a minimally invasive vaporisation or for reshaping the soft tissue, otherwise to uncover the implants.

The advantage of this technology is the absence of bleeding and the possibility to uncover the implant through a tiny cut, which can be enlarged later.

This technique can also be performed in the incisors area in case of enough gum. If the doctor decides to use the diode laser only the doctor, in this phase is possible to take the impression because the soft tissue is not altered and there is not any post-operative contraction.

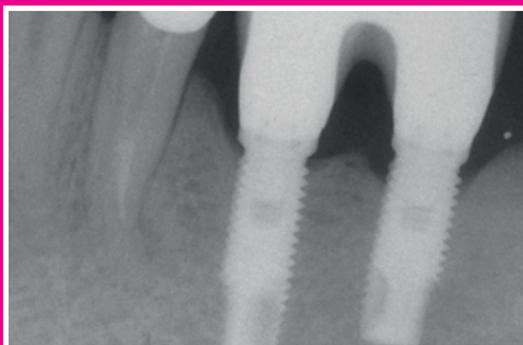
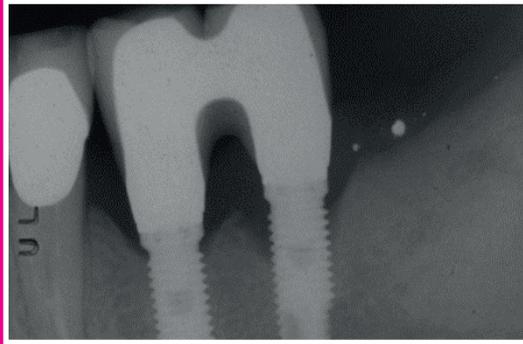


Scopertura di un impianto. Immagini Doctor Smile

## PERI-IMPLANTITIS

Peri-implantitis are inflammatory processes of the soft and hard tissues which determine the gradual loss of osseointegration, always paired with bleeding (this is absent in bone losses due to overweight) and sometimes with suppuration.

They are characterized by the loss of bone at the implant level, which verifies once the osseointegration is done and that overtakes the reabsorbing limits for the implants. Peri-implantitis are the first cause of loss of implants themselves. The principal cause of this pathology is the presence of bacteria: the bacterial plaque colonizes the surface of the fixtures and determines pain, inflammation and the gradual reabsorbing of the tissues. The laser thus is almost fundamental due to its capacity to not altering the implants, its deep decontamination and biostimulating effects.



Peri-implantitis treatment by using the laser. Images by M. Roncati

# CLINICAL INFO

## PERI-IMPLANT BONE REGENERATION

### Case treated by

Dr Gianluigi Caccianiga  
Bergamo



The patient is affected by periodontal and peri-implant infections. Steps of the treatment:

- a non-surgical periodontal and peri-implant treatment (diode laser/SIOXYL+ solution, Er:YAG laser).
- b surgical peri-implant treatment and laser assisted bone regeneration (diode laser/SIOXYL+ solution, Er:YAG laser).
- c definitive implant-prosthetic rehabilitation.

### Patient:

Age: 46.

Gender: female.

General history: patient in menopause and under hormonal therapy, hyperglycemic and hypercholesterolemic.

Case history: periodontitis and diffuse peri-implantitis both in the maxillary arch and in the mandibular arch, in subjects with a low dose of vitamin D, in the presence of hypercholesterolemia and hyperglycemia.

Diagnosis: Periodontitis and diffuse peri-implantitis both in the maxillary arch and in the mandibular arch.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Peri-implant and periodontal surgical and non-surgical therapy, paired with high frequency ultrasounds, glycine and sodium bicarbonate airflow, curettes, filling biomaterials.	None.	The pathogenic periodontal bacteria can not be definitively removed by using the conventional protocol. Furthermore, the typical laser biostimulation effect is missing.
Laser	Peri-implant and periodontal with high frequency ultrasounds, glycine and sodium bicarbonate airflow, curettes, diode and Er:YAG laser.	Effective decontamination and biostimulation, which helps the lost tissue regeneration.	Accidental optical fiber activation risk, important to verify and frequently clean up the fiber.

### Treatment:

Laser handpiece on site: Er:YAG laser with non-surgical approach (energy 80 mj frequency 10Hz tip 600 micron).



Laser handpiece on site: non-surgical approach. Diode laser 400 micron tip, peak power 2.5W, average power 0.5W, frequency 10,000Hz, SIOXYL+ Solution).

Er:YAG laser: surgical approach (energy 80 mj frequency 10 Hz 600 micron tip) to eliminate the bacterial biofilm from the implant's spiral.



Bone window opening by using the Er:YAG laser in order to perform a crestal sinus lift.

**Conclusions:** Laser technology used with a penetrating wavelength (diode laser) paired with the SIOXYL+ Solution, guarantees decontamination and biostimulation. The Er:YAG wavelength, helpful in the bone regeneration and in the peri-implant biofilm removal, has allowed to recover the patient's dental-periodontal health, by offering the opportunity to rebuilds the atrophic maxillary bones, in a patient ormonally and biochemically unstable.

## CLINICAL INFO

# PERI-IMPLANTITIS TREATMENT

Patient:

Age: 55.

Gender: male.

General history: N/A.

Daily habits: 3 coffee and a cigarette pack.

Oral hygiene: decent.

Pathology: mucositis.

Case treated by

Dr Marco Moscato  
Rome



Peri-implantitis and mucositis are very discussed topics, different guidelines and valid protocols exist in order to decontaminate the affected area, to stimulate the bone healing in a way to guarantee a higher implant persistence rate. Diode laser finds its dimension in all these protocols due to its decontamination power, to the coagulant effect, the biostimulating action in order to make the healing faster and more predictable.



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Anesthesia, ultrasounds, chlorexidine irrigations scaling.	Mucositis healing within a very brief follow-up.	Anesthesia, long recovery time, multiple sessions needed.
Laser	Absence of anesthesia, ultrasounds, diode laser 2,5W power for 30 sec paired with hydrogen peroxide irrigation.	Fast technique, painless, absence of anesthesia and brief time.	None.

### Treatment:

Diode laser and hydrogen peroxide irradiation.



Site condition after 3 days.

Site condition after 7 days.



**Conclusions:** In case of mucositis diode laser combined with manual instruments and the irrigation with hydrogen peroxide, guarantees an effective decontamination and helps the recovery of the site. All of this without surgery, no anesthesia and with elevate comfort for the patient.

# THERAPY



HERPES SIMPLEX | APHTAE | CHEILITIS ANGLE  
HYPERSENSITIVITY | TRISMUS TMJ | BIOSTIMULATION  
FLAT TOP HANDPIECE | LASER ANALGESIA

Therapy is one of the fields where the laser has huge importance and effectiveness thanks to the analgic and anti-inflammatory effects that the beamed light can provide. The low level laser therapy (LLL) or low intensity laser therapy (LILT) is performed by using low or medium average power (from a few mW to about 1W, according with the most of the international literature). It has been scientifically demonstrated that the effect of this amount of energy encourage the ATP production which increases the cell metabolism, the collagen neo synthesis, the stimulation in the production of DNA and RNA, local effects on the immunity system, neurostimulation and other biological effects.

## HERPES LABIALIS

Herpes labialis is a viral disease generally caused by the virus herpes simplex 1. In its first stage a sense of discomfort is felt, followed by the appearing of sores in the lips area. At the final stage a tiny crust appears (usually after a few days) which indicates the scarring phase of the lesion.

Using the laser, with its decontaminant and biostimulant activity, speed up the recovery time and alleviates the discomfort for the patient. It is important to start the treatment during the prodromes phase or immediately after the appearing of the lesion. The sore is beamed for a few minutes without any drug. After 24h, the lesion appears dried. The full recovery is achieved after 3 days from the begin of the therapy.



## APHTAE

Aphtae is a whiteish – greyish lesion surrounded by a reddish halo, which dimensions can be from 1 to 10 mm. They usually appear on the gum or buccal mucosa.

Frequently, this lesion tends to evolve for inflammation, becoming a little whiteish sore which causes pain and burning above all when hot/spicy/salty/sour food is eaten. The healing time is about 10/15 days. Using the laser the inflammation and the pain decrease, the healing process is speeded up and it is achieved in about 4 days. The laser can be used softly and lightly in contact with the lesion. If necessary repeat the treatment after 48h.



## CHEILITIS ANGLE

Cheilitis angle is a lesion that usually occurs at the corners of the mouth. It can be caused by stress, antibiotics, allergies or candida. Its symptoms include itching, exfoliation of the lips, painful cuts. Laser treatment on and around the affected area will destroy the bacteria responsible for the inflammation. For best results one treatment every three days for two weeks will yield definitive results.

## HYPERSENSITIVITY

Dentinal hypersensitivity is a quite common issue. Usually it is treated with the application of desensitization products (both domestic and professional), able to seal the dentinal tubules. The fluoride based gel (NaF) is the most common one, which works by sealing the tubules using insoluble calcium fluoride. Since this material do not stick directly to the tubules, over the time the benefic effect disappears due to the acid environment of the mouth. It has been clinically shown that the combined use of the gel with the laser light causes a “melting” effect in the dentin, sealing the tubules openings and coagulates the liquids inside.

## TRISMUS TMJ

Therapeutic indications of diode lasers include TMJ arthralgia (treatment of the joint); myofascial pain related to TMJ (treatment of the muscle related to painful trigger points); and muscle relaxation (related to pain and muscle stiffness after dental procedures or in general). The therapeutic mechanisms of action of diode lasers include increased micro-circulation in tissue, photo-activation of inactive enzymes, improved cellular function, and increased ATP production. Pain relief with laser therapy is effective, fast and drug free.



## BIOSTIMULATION - FLAT TOP HANDPIECE

The biostimulation effect is achievable using a low density defocused light beam; in this way energy is absorbed by the tissues, stimulating the metabolic processes. These effects are possible thanks to the thermic and photochemical energy action of the laser light. The therapy is provided by beaming the area with a minimum intensity (mW) using specific handpieces. At this intensity there are no macroscopic alterations in the tissue, but it gives pain relief to the patient desensitizing the area and producing a general heat feeling. Several scientific studies confirm better wound healing, more vascularization and pain relief.

## LASER ANALGESIA

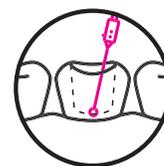
The anti-inflammatory effect of the laser can be used for a drug-free analgesic therapy, in order to treat painful conditions in the oral cavity. Patients will benefit in only a short number of sessions.

# CONSERVATIVE

## SEALING GROOVES | CAVITY DECONTAMINATION

The laser is useful during groove sealing, because it decontaminates the occlusal surface. This improves the effectiveness and the duration of the sealant over time.

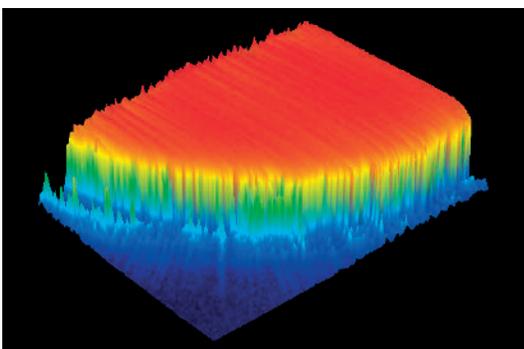
For the same reason a passage of laser energy is recommended for an accurate and thorough decontamination during cavity preparation before filling.



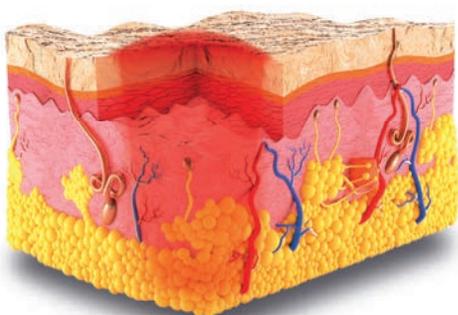
# PHOTOBIO-MODULATION



Photobiomodulation (PBM) can be defined as a manipulation of the cell metabolism through the transfer of light energy. Photons are able to interact with the molecules localized inside the cell, transferring them their energy. Molecules in this way doped then can lose the energy releasing it as heat, can freed it like a fluorescence or keeping it to trigger a photochemical process. This last possibility is what happen in the PBM, where an plant photosynthesis-like interaction happen in an animal cell. Our scientific knowledge allows us to understand that the target phenomena which can induct a PBM covers key role in the life of a cell. On wavelengths between 600nm and 1064nm the targets known are the mitochondrial breathing chain, and the not well known photoreceptors involved in the balance of the signing molecules, like the oxygen reactive species (ROS), the nitric oxide (NO) and the calcium ione ( $CA^{2+}$ ). In particular below the 900nm seems that the photoreceptors are localized at the mitochondrial level and therefore in these wavelengths the PBM is mostly an interaction between photon and mithocondrion, based on the citocromo-c-ossidase (IV complex of the photo-micochondrial breathing chain), which presents an absorbing peak in the red region (600-700nm) and in the infrared close to the NIR in the spectre (760-900nm), related to its oxydative stage: the I and II complexes are not stimulated while the III (808nm) it is but partially. The fact that typical plant-light interaction can appear also in animal cell doesn't have to appear weird. In fact, the chemical reaction in the plants happen in the citoplasts, which have a common bacterial origin with the mitochondres, with which they share proteins conserved in the electrones transport chain and which show biochemical stereo-elective paths in common, and their bioenergetic molecular biology also share basic chemical processes.



Uniform energy density with elevate tissual penetration



The Flat Top handpiece AB2799 is a fundamental device to obtain positive effects on the cell membrane and on mitochondres, with improving of the healing of the wounds, in the tissue reparation and in the prevention of tissutal necrosis. Invented by Prof. Alberico Benedicenti from Genova University in partnership with Doctor Smile, is a device which can provide an ideal and constant light quantity on a 1cm<sup>2</sup> surface until a distance of 105 cm from the interested area, mantaining the same benefic effect. In this way the properties of the laser that is modulated grant a further increasing of ATP and protein synthesis, providing an anti inflammatory and biostimulant cell reparation activity.

# CLINICAL INFO

## HERPES SIMPLEX

Patient:

Age: 45.

Gender: female.

General history: nothing relevant.

Case history: the patient suffers from frequent relapses with burning pain and blisters extended on a large area.

Diagnosis: Herpes Simplex caused by HVS1.

Case treated by

Dr Nunzio Tempesta  
Terlizzi (BA)



Case of a patient with recurrent labial Herpes Simplex. Some patients suffer from this pathology that occurs frequently. This clinical case emphasizes how extensive and socially disabling the injury is. The use of Wiser drastically reduces healing times and the frequency of relapses.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Topical applications of creams with antiviral topical active ingredients. Systemic antivirals.	Topical treatment with good patient adherence.	Long healing times. Disappearance of the slowest pain. Aesthetic imperfection caused by the visibility of the cream.
Laser	Wiser treatment. Dedicated defocused tip.	Fast painless treatment. Antalgic effect. Reduced healing time.	Non reported.

### Treatment:

Treatment with Wiser and defocused fiber.



Immediately after treatment with Wiser and defocused fiber.



During the second application of Wiser fiber in the same session, the lesion is touched with superficial and fast movements.



Healing complete.



**Conclusions:** Thanks to Wiser, we are able to bring the herpetic lesion from the bullous phase to the crusty phase and accelerate the healing time in one session. Pain and burning disappear in 30' after application. It also avoids using systemic antivirals, even in severe cases. Contrary to what would happen with creams or suppurating blisters, the patient can apply coverage makeup on the lesion to improve the quality of social life. If applied upon the first sign of disease, Wiser blocks the progression of the lesion.

## CLINICAL INFO

# DESENSITIZING THE PHARYNGEAL REFLEX

Patient:

Diagnosis: the pharyngeal reflex can be effectively inhibited, thanks to the Flat Top Handpiece application. The effect is particularly appreciated in those patients who suffer a violent reaction, even if the clinician only tries to introduce the X-ray holder.

Case treated by

Dr Marisa Roncati  
Ferrara



During some dental procedures, such as taking impressions or intraoral X-rays, a regurgitation reflex can be caused with consequent uneasiness both for the patient and the clinician.

before



after

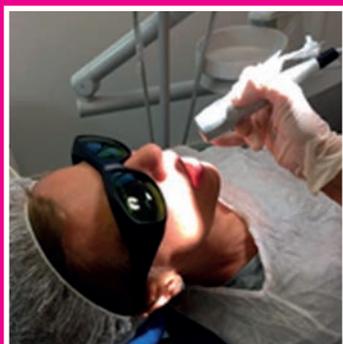


## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Alternative method: melting an ice cube on the palate, simultaneously breathing through the nose and lifting one leg, so the patient is distracted.	Occasionally it can work, if the operator is very quick to introduce the centering device with the radiogram, while using the X-ray tube.	Very difficult maneuvers and with no guarantee of success.
Laser	The specific flat wave handpiece is used to inhibit the pharyngeal reflex.	Undisputed advantages, for both clinician and patient.	None.

### Treatment:

The handpiece can be held by the clinician at a distance ranging between 1 cm and 1 m, while maintaining excellent effectiveness.



A power setting of 0.2W to 0.3W is selected, in continuous mode (CW).

Radiography in which it was not possible to include the distal aspect of the right maxillary 2<sup>nd</sup> molar, because the patient suffered a particularly pronounced regurgitation reflex during insertion of the centering device.



Radiography provided in 2020, by using the following treatment which allowed to perform a much more compliant radiogram from a diagnosis point of view.

**Conclusions:** It was possible to insert the centering device, in order to impress the distal aspect of the right maxillary 2<sup>nd</sup> molar in the periapical radiograph and also including more posterior sites, very essential especially in case of presence of the 3<sup>rd</sup> molar. It may be necessary to repeat the procedure several times, in order to ensure the result.

# CLINICAL INFO

## LIP APHTAE

Patient:

Age: 27.

Gender: female.

General history: patient in good health.

Case history: Aphtae lesion on the vermillion lip, typically related with a stressful period and change of season. In its first stage, the lesion appeared circular, flat and about 4 mm wide.

### Case treated by

Dr Marco Moscato  
Rome



Case of lip aphtae, on a patient subject to recurrent aphthosis. This type of injury is more common in female people, aged 20 to 40 years.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Topical applications of cream with antiviral or cicatrizing ingredients.	Disappearing of the lesion in about 10 days, with burning and pain reduction.	Difficulty in the management of topic therapies.
Laser	Treatment using Wiser laser with defocused lens and not in touch; through three steps steps 2 minutes long each one upon the lesion.	Disappearing of the painful symptom since the day after the operation, full healing in 5 days.	None.

### Treatment:

Laser application with therapy tip and pre-set parameter.



After 7 days.

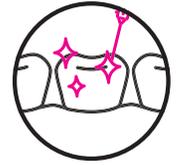


Post-operation, with stable situation.



**Conclusions:** The treatment of the aphtaes by using diode laser is a predictable and safe therapy, the patient doesn't feel neither touch nor pain, therefore the procedure can be performed also without anethesia and within minutes. After the treatment, the patient will instantly feel a relief sensation and the wound will recover quickly, in about 5-6 days. The scar regression will begin just after the laser treatment.

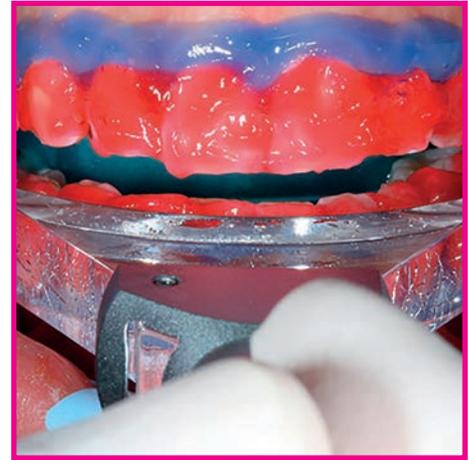
# COSMETICS



WHITENING | GUMMY SMILE | HAEMANGIOMA | DEPIGMENTATION

## WHITENING

The laser is undoubtedly the fastest and most effective way to achieve naturally white teeth. The laser light is used to activate a special whitening gel that can also be used on sensitive teeth, without discomfort. A gel containing hydrogen peroxide  $H_2O_2$  spread over the surface of each tooth can be initiated with a special defocalized laser handpiece. The initiation sets off the release of the oxygen that breaks the double bond of the pigments on the teeth, making them lose their colour. Laser initiation of hydrogen peroxide greatly speeds up the bleaching process: a 30 minute session is often sufficient to obtain great results. To protect the gums from any irritation, a liquid dam can be applied.



## GUMMY SMILE

Excessive gingival tissue is often known as a gummy smile. It is an important cosmetic treatment because it can radically improve the overall aesthetics of a smile, with a simple and minimal invasive procedure. The laser can shape the contour of the gum into a perfect shape, without pain or bleeding.



The **LWS Laser Whitening System** is a professional product for whitening with the Doctor Smile laser technology. The whitening action is triggered by a photo-initiation process of the LWS gel, containing hydrogen peroxide: the product, applied on the surface of each tooth, is initiated by the laser which provides the release of free radicals. Their action on the molecular pigments create an astonishing whitening effect.

**A bright smile in just 10 minutes. Guaranteed!**

## HAEMANGIOMA

Haemangiomas often cause discomfort and are certainly not pleasant aesthetically, especially when they are quite large in size. If they are present around the mouth (cheek, tongue, lip) they can also become a functional problem when they interfere with mastication: if cut by teeth they may bleed intensely. Often they are treated with surgical procedures that require stitching. On the other hand a few minutes of laser energy are sufficient to coagulate the mass of blood in the hemangioma, without it spilling out. The lesion will turn whitish and then disappear over a few weeks.



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## DEPIGMENTATION

With the laser, it is possible to remove stains present on the gum, be they natural or caused by the presence of amalgam or other pigmented substances. The ablative and coagulating effect of the laser beam can remove the stains without pain or bleeding.



## CLINICAL INFO

# LASER DENTAL BLEACHING “LWS”

Patient:

Age: 50.

Gender: female.

General history: patient in good health who wants to improve the aesthetic condition of her smile.

Case history: we choose to proceed with a professional laser dental bleaching LWS in order to satisfy patient's needs, in view of a prosthetic treatment of elements 35; 36.

Case treated by

Dr Claudio Pasquale  
Genoa



In the dental bleaching practice, the laser light is able to accelerate the production of reactive oxygen species used by the peroxides, thus ensuring maximum effectiveness in terms of results and total safety for hard tissues, thanks to the less application times.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Non-photoactivable products are unable to release all the reactive oxygen species, necessary for a good result.	These kind of products cost less.	Significant increase in the overall application time of the bleaching gel, with consequent possible damages to hard tissues.
Laser	One session: 24 minutes total time for the application of the LWS bleaching gel; method: diode laser 980nm, 2W power x 30 sec for each tooth, using the special Flat Top handpiece.	Considerable reduction of tooth gel application time.	None.

### Treatment:

Activation of the bleaching gel with a Flat Top handpiece: the photo is only a sample.



Photo and pre-bleaching color: provisional crowns 35;36.

Photo and post bleaching color after 48 hours; excellent mimicry of the provisional crowns 35;36.



6-year follow-up compared with the starting color, with final prosthetic elements.

**Conclusions:** In just one session, we obtained an exceptional result that is capable of being maintained over time, while totally preserving the integrity and general health of the patient's oral tissues.

## CLINICAL INFO

# ORAL CAVE HEAMANGIOMAS TREATMENT

Patient:

Age: 68.

Gender: male.

General history: nothing relevant.

Case history: presence of a lesion in the inner side of the cheek. After the transillumination test, the diagnosis is confirmed: monodistrictual haemangiomas, a benign lesion of the blood vessels made by a strongly irregular intertwining of vascular structures.

Case treated by

Dr Nunzio Tempesta  
Terlizzi (BA)



Haemangiomas appearing on the oral cavity (cheeks, tongue, lips) can be either an aesthetic or functional problem. When they appear on the tongue or on the cheeks they can interfere with the chewing process. They can also be traumatized by the teeth and bleed strongly.

before



after

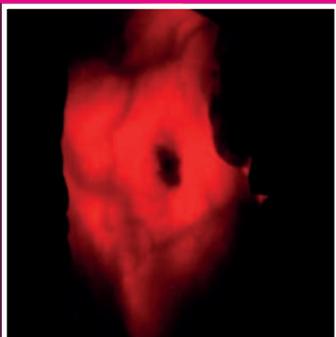


## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Bisturi surgery.	None.	Strong bleeding. Sutures. Slow healing. Anesthesia by infiltration. Post-surgical discomfort.
Laser	Wiser laser.	Topic anesthesia only simple procedure. Hemostasis. Quick healing. No sutures. Reduction of septic complications. Reduction of relapses. post-surgical comfort.	None.

### Treatment:

The transillumination based on a cold light, allows an easy anatomic study of the venous reticulum.



Irradiate by using the laser with brushing movements.

Haemoglobin treated with laser immediatly turns whitish.



The transillumination test, performed after the laser treatment, highlights the disappearing of the vascular lesion.

**Conclusions:** With diode laser is possible to operate with minimal invasiveness on the vascular lesions of the oral cavity, by applying the FDIP technique (Forced Dehydration with Included Photocoagulation). The affinity between haemoglobin and the diode laser plays a significant role during the treatment. The lesion disappears after about 2-4 weeks, getting a first whitish appearance, then the normal look of the tissue is re-established.

# DERMATOLOGY



## DERMATOLOGICAL SURGERY | SKIN DEPIGMENTATION SKIN BIOREGENERATION

Thanks to the diode laser, the removal of nevis, sores, pensulum fibromas turns easy and completely scarless. It is also possible to remove tiny superficial stains for example on the face, on the hands or on the chest. By using the exclusive REVIVE handpiece, it is possible to supply a non-ablative skin bio regeneration, which allows a collagen neosynthesis. This treatment increases the skin tone, reducing wrinkles at a periocular or a perioral level.

### DERMATOLOGICAL SURGERY

The diode laser is surely the ideal technology to perform little dermatological surgery operations which are completed in a few minutes, with a perfect bloodless visual. The treatment is performed by vaporizing the lesion layer by layer (nevis keratosis), which appears flat therefore doesn't need to be cut. In case of pensulum fibromas, which call for an incision, it is possible to operate putting the lesion itself in traction by using tweezers. In this way it is possible to operate correctly. Sutures are never necessary, the treated area recovers by second intention without scarring, usually painless and without any drug. It is recommended the application of a moisturizing cream in the days next to the operation for better healing.

### SKIN DEPIGMENTATION

Simple skin stains due to ageing or solar overexposure can be removed by vaporizing the tissue. The laser effect allows to remove the pigmented tissue through repeated stages in contact with the skin, in this way the stain is treated layer by layer. At the end of the operation, the skin will appear reddish due to the thermic increase achieved during the irradiation. The red halo will disappear within a few days; in the most of the cases a topic anesthesia can be performed with lidocaine-based products. It is recommended the application of a moisturizing cream in the days next to the operation for better healing.



**REVIVE**  
SKIN PROCESS

## HANDPIECE

The **dermatologic REVIVE handpiece**, thanks to its biostimulating and regenerative features, allows to eliminate the skin diseases in a totally non-invasive way, without sutures, absence of cicatricial outcomes and with a simple post-operation period which does not influence the patient's daily activities until its full healing. The regenerative action of the laser is helpful also in anti ageing treatments, by assisting the natural skin reparation processes.

### SKIN BIOREGENERATION

Since years laser has been recognized as one of the most effective methods in skin rejuvenation. Its capacity to trigger restorative mechanisms makes it a very functional system for improving the skin tone, the microcircle and skin oxygenation, biostimulation and following collagen neosynthesis, reduction of acne in active phase. It is possible to improve the look of a face in a few sessions. The treatment is performed by using the specific handpiece that focuses the laser light in a 5 mm<sup>2</sup> area. It is recommended to treat single areas well defined, in order to concentrate the laser effect. The operation is well tolerated and it does not need any anesthesia.



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## CLINICAL INFO

# SKIN PIGMENTATION REMOVAL

Patient:

Age: 52.

Gender: female.

General history: moderate skin ageing.

Case history: presence of a few superficial skin stains.

Case treated by

Dr Stefano Salmini Sturli  
Padua



Skin pigmentation is a common disease, but thanks to the diode laser, it can now be treated effectively and in a short time.

before



after



## Hypothetical treatments

	Methods	Benefits	Disadvantages
Traditional	Removal by using liquid nitrogen.	None.	Daily medications for 7-10 days. Application of antibiotic cream. Slow healing.
Laser	Removal by using diode laser.	Fast operation time, decontamination of the treated area, accelerate healing, post-operative drugs not needed.	None.

### Treatment:

The patient is affected by skin pigmentation. Initiate the fiber by firing on a dark paper in order to ablate.



Perform a complete vaporization of the pigmented tissue, through brief touches of the fiber on the skin.

During the follow-up after 7 days, the skin shows a proper healing process without any side effect.



**Conclusions:** Skin stains removal through laser ablation is a simple, safe and effective treatment; no side effects are present and it guarantees an immediate result. It is important to apply a high SPF photoprotective cream on the interested area, for at least 10-15 days after the operation, in order to avoid any reactive hyperchromies.



# WEBINAR ON LINE COURSES

Master Class Academy is thrilled to offer a series of educational webinar, watchable from any device and wherever you want. The goal of these courses is to provide a theoretic support to the professional to easily find out the functional principles, the advantages and the applications of the laser technology in the dentistry field.

The online courses are realized in partnership with the most important relators in order to provide educational and introductory information related to the usage of the laser in dentistry, and to supply didactical support from remote.

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# LASER TECHNOLOGY

## THE NEW SMILE'S FRONTIER

A book suitable for whom wants to approach and understand the secrets of the diode laser technology in order to use its laser easily and safely, enlarging the range of services the practice can offer to the audience.

Inside you will find:

- laser physics and laser-tissue interaction concepts
- a wise clinical history, well documented with pics
- clinical protocols immediately usable
- large biography referrals



by Franco Barzè  
Myriam Pulido

Italian and  
Spanish version

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