

# Depigmentation of gingivae and lip with **Digital Pulsed Diode Laser**—an integral part of Cosmetic Dentistry

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**Melanin** is the most common natural pigment contributing to normal colour of the gums. Although ethnic and physiologic melanin pigmentation is not a medical pathosis, the appearance of pigmented gums is considered unaesthetic and overlooked at times in cosmetic dentistry assessments. Various laser wavelengths have been reported for removal of melanin pigment with good results. Removal of mucosa to the basal layer is the common procedure using lasers or conventional abrasive technique using diamond burs. Pigmentation of the lip is another aesthetic concern to patients affecting their confidence and quality of life.

## Background

Diode laser at 810 nm is transmissive through water, and is attracted to pigment such as haemoglobin and melanin. The continuous wave or the mechanically gated pulsed mode both produce a long tissue interaction time, which require much longer relaxation time for tissue to cool down. Hence, low power (1 to 3 W) is recommended for most soft tissue procedures. The use of "High Fluency Technique", for 980 nm diode wavelength developed by Dr Mick Swick, is able to increase power and reduce collateral tissue damage and heat stacking effect by using water irrigation as a cool-

## Case 1



lant. The major precaution for any soft tissue laser procedure is to avoid deep penetration of the laser energy, which can cause collateral thermal damage to the underlying bone or adjacent tooth structures, especially when using a non-contact and/or non-initiated tip. Digital pulsed diode laser is the 4<sup>th</sup> generation of diode laser technology. Dr Claus Neckel compared fibromas excised by the pulsed diode laser with continuous wave diode laser. He demonstrated the substantial reduction in collateral thermal damage histologically with high power (30 W), short pulse (10  $\mu$ s) with high frequency (10,000 Hz). As melanin is deposited at the basal layer of the

**Fig. 1**\_ Pre-op.  
**Fig. 2**\_ Immediate post-op.  
**Fig. 3**\_ Pre-op.  
**Fig. 4**\_ 18 months post-op.  
**Fig. 5**\_ 4.5 year post-op.

mucosa, removal of this pigment by various lasers have been reported by direct ablation (cutting) of the mucosa to this layer. Energy delivery time ranges from 10 to 30 minutes in an area of 1<sup>st</sup> premolar to 1<sup>st</sup> premolar of one arch. The technique described in this case series differs from other laser techniques in terms of tissue absorption and procedure time.

**Procedure for depigmentation of gingivae**

Elexion Claros DPL Laser set at 30 W, 16 μs, 20,000 Hz; average power close to 10 W.

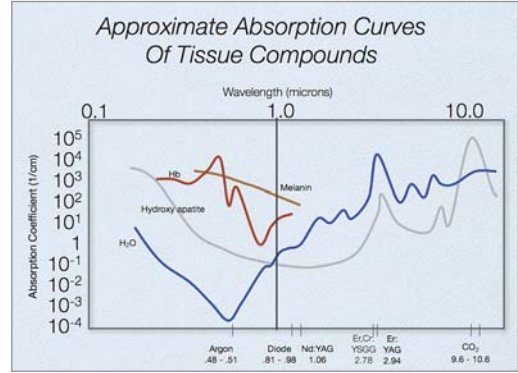
Under local anaesthesia, a non-initiated 600 μm fiber delivers the energy at a distance of 2 mm to 5 mm to the pigmented area with constant movement under water irrigation as coolant. There is no direct ablation of the pigmented mucosa but rather the hemoglobin and melanin absorbing the laser energy. Procedure time ranges from two minutes to seven minutes in an area of 1<sup>st</sup> premolar to 1<sup>st</sup> premolar of one arch.

**Case 1**

The procedure took approximately 2 minutes to complete between upper left and right premolar region. 4.5 year post-op showed mild relapse of pigmentation but patient is still happy with the colour. Laser soft tissue crown lengthening was carried out on upper anterior incisors and canines.

**Case 2**

The procedure took approximately 7 minutes to complete between upper left and right premolar region.



**Table 1** Graphic display of chromophores of various wavelengths. The 810 nm diode is indicated.

**Case 3**

The procedure took approximately 2.5 minutes to complete between lower left and right premolar region. Ceramic crowns replacing all porcelain fused to metal crowns

**Procedure for depigmentation of lip**

The procedure is the same as for gingival depigmentation. As it took only seconds to complete the procedure, there was no need for water cooling.

**Case 4**

The procedure took 8 seconds to complete under local anaesthesia.

**Case 5**

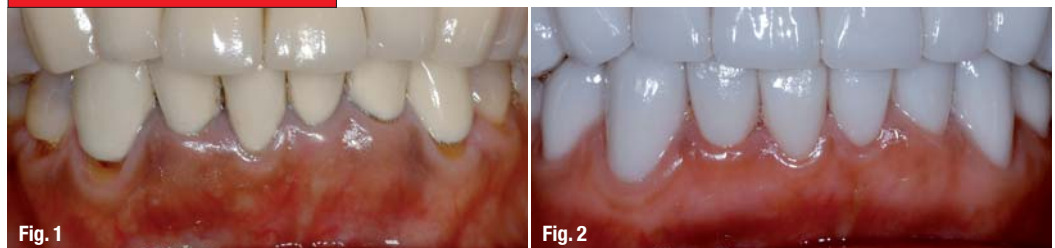
Procedure time: 3 separate visits under topical anaesthetic over 8 months (4 sec, 5 sec, 11sec)

**Case 2**



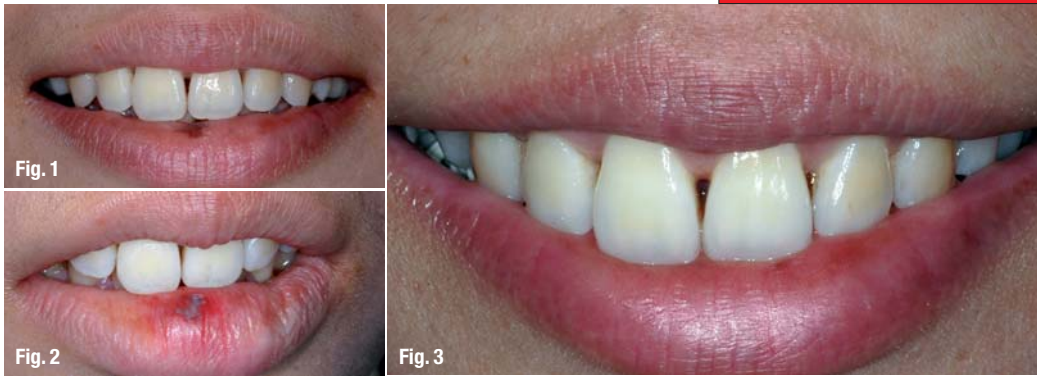
**Fig. 1** Pre-op.  
**Fig. 2** 1.5 year post-op.

**Case 3**



**Fig. 1** Pre-op.  
**Fig. 2** 3 months post-op.

**\_Case 4**



**Fig. 1**\_Pre-op.  
**Fig. 2**\_Immediate post-op.  
**Fig. 3**\_1.5 year post-op.

**\_Case 5**



**Fig. 1**\_Pre-op.  
**Fig. 2**\_6 months post-op.

**\_Results**

There are two possible immediate visual post-op results. In ideal case (Case 1), the mucosa turns pink without any signs of surface mucosal damage. Sub surface coagulation of blood vessels gave a pink coloured appearance. No laser peeling of mucosa was noted post-operative result. Other cases vary in degree of immediate aesthetic improvement or darkening of the pigmented mucosa where absorption by melanin is the dominant. Laser peeling of the mucosa were reported within a few days of treatment. In all cases, there were zero to mild post-op pain. No analgesics were required.

**\_Conclusion**

This technique requires specific high power settings. Operator should be aware of tissue interaction during the procedure and adapt accordingly. Long term relapse of the condition is comparable to direct removal of pigment by lasers or other techniques. Pa-

tients were all satisfied with the results. The main advantages with this technique are minimal invasive technique, short procedure time and immediate aesthetic results in some cases.

Advantages	Disadvantages
Minimal invasive technique	Local anaesthetics
Short treatment time	Immediate aesthetic results cannot be achieved in every case
Pain free post-op (Immediate aesthetic results)	Technique sensitive
	Specific power settings not applicable to other diode lasers

**\_contact**

**laser**

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