Non-ablative melanin depigmentation of gingiva

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Melanin depigmentation of gingiva using various laser wavelengths have been reported for over ten years.1–5 Layer by layer, the mucosa is ablated to the basal layer of the epithelium where the melanocytes are located. The use of lasers have been compared with the use of scalpel and diamond bur (Fig. 1).6–9 By incorporating the optical properties and absorption characteristics of 810 nm together with specific power parameters, a non-ablative technique was developed (Fig. 2).10, 11

Another similar non-ablative technique described as microcoagulation was also reported using a 20 W 980 nm diode laser.12 The 445 nm blue wavelength was introduced in the dental market in 2015. By using 320 µm uninitiated fiber delivering 1 W continuous wave of 445 nm, the same non-ablative procedure and result can also be realised.

Background with non-ablative technique

Diode laser at 810 nm is poorly absorbed in water, but it is well absorbed by pigment such as haemoglobin and melanin. The use of high power, short pulse duration concentrated the thermal energy on the surface over deep tissue thermal conduction with lower power and long pulse.13, 14

The author has used the 810 nm wavelength (elexxion claros 810 nm diode laser, elexxion AG, Singen, Germany) with the power parameters of 30 W, 20 kHz, 16 µsec giving an average power of 10 W. Under local anaesthesia, a non-initiated 600 µm fiber was used. The fiber was placed at a distance of 2 mm to 5 mm from the pigmented mucosa. Coagulation can be observed with immediate effect upon irradiation.

A constant movement must be performed in order to avoid thermal damage deep into the tissue. Water irrigation can be used as coolant.

Fig. 1: Depigmentation by ablation.
Fig. 2: Depigmentation by absorption of melanin and haemoglobin.
Fig. 3–6: Depigmentation on upper arch using 810 nm at 30W, 20 kHz, 16 µsec, pre-op (Fig. 3), immediate coagulation (Fig. 4), three weeks post-op (Fig. 5), eight years post-op (Fig. 6).
Fig. 7: Absorption Spectra of biological materials. (Courtesy of J. Meister)
Fig. 8–11: Depigmentation of lower arch using 445 nm at 1 W cw, pre-op (Fig. 8), immediate post-op (Fig. 9), one day post-op (Fig. 10), one day post-op laser peel between 31, 41 (Fig. 11).
Fig. 12: Three days post-op (photo taken by patient on holiday).
Fig. 13: Two weeks post-op.