Epilation with a new Double Wavelength IR-Laser MeDioStar miXT 940
- Preliminary examination -

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Introduction

Lasers have been used for epilation since more than 10 years now. The first epilation laser used was the microsecond Ruby laser, emitting red laser light at 694 nm. With a better understanding of the interaction of light with hair and skin, and their different thermal relaxation times, there was a movement towards longer pulses (30 ms or longer). Longer pulses were found to be better, both from a safety, as well as from an efficacy standpoint.

The mechanism of laser epilation involves the absorption of laser light by the pigment melanin. The melanocytes of the hair bulb and the melanin in the hair shaft heat up due to exposure to the laser light, as a result of which the hair follicle is damaged. Long pulses lead to heat diffusion from the bulb to the area of the bulge and the matrix cells, leading to destruction of the capacity for new hair follicle formation, and this leads to long-lasting results. The higher the melanin absorption the better the effect, provided that the pulse duration is long enough and the penetration of light deep enough to reach the hair bulb. These aspects lead to a wavelength of about 810 nm (see fig. 1).

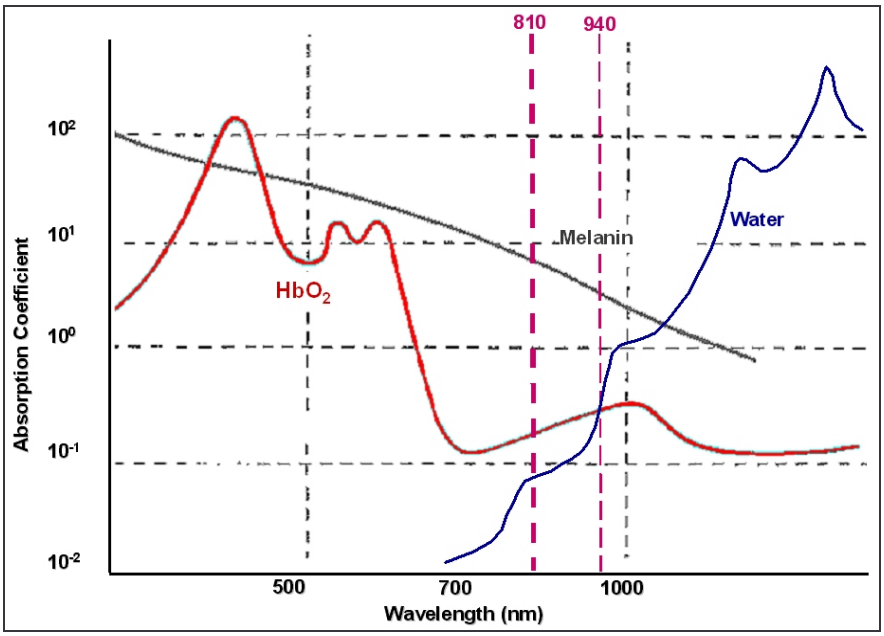

Figure 1: Absorption graph

However, while hair removal with 810 nm lasers has been shown to be highly effective, sometimes it leads to unintended side effects, like pain, redness, swelling, and pigmentary changes. This is especially true for dark-skinned patients, because of the higher amount of melanin in the epidermis. Thus, for dark-skinned patients, a wavelength like the 940 nm may be more appropriate, because it is absorbed less in melanin, while still retaining sufficient absorption for effective hair removal. The longer wavelength has other advantages. Its penetration depth is higher, leading to more effective treatment of deeper hair follicles. Finally, its higher absorption in blood means that it can also damage the capillary micro-structures around the hair follicle, leading to a possible additional mechanism for epilation. From this aspect it is better to take a longer wavelength with sufficient melanin absorption for dark hair – like 940 nm (see fig. 1).

The new MeDioStar miXT is the first laser worldwide which combines the two wavelengths 810 nm and 940 nm in one laser device. In each case one has to find an optimal solution for the different skin types. Therefore two different versions of the MeDioStar with miXT wavelengths are offered. We used the version with a higher percentage of 940 nm, because, in general, our patients have dark skin.

Materials and methods:

We started this study for laser epilation since September. The intention of the study is to compare the outcome and the side effects in a side by side comparison of the well established MeDioStar (wavelength 810 nm only), which we have already been using since some years and the new MeDioStar miXT (version with mainly 940 nm). The light source of both MeDioStars consists of a series of compact and efficient semiconductor diode arrays with high power of up to 500W at the skin.

We used both lasers on the same patient with the same parameter settings: 12mm spot size, fluence between 20J/cm² and 30J/cm² (set at as high as it was possible for the patient without causing undue discomfort).

The patients were treated at three locations on their forearm, with the MeDioStar 810 on the left, the MeDioStar miXT (high 940) in the middle at the same fluence level, and the MeDioStar miXT (high 940) at a higher fluence (4-6 J/cm^2 higher) on the right (see picture 1).

10 patients were treated, for one session so far, with an age group between 22-35 years, with six males, and 4 females, skin type IV - VI.

The evaluation was done with respect to efficiency of the treatment [scale 1(very good) – 5 (no difference after treatment)] and side effects like discomfort [scale 1 (no) – 5 (break necessary)], erythema [scale 1 (no) – 3(strong)] , edema [scale 1(no) – 3(general)], burned hairs [scale 1(no) – 3(some)], pigment changes (hypopigmentation, hyperpigmentation).

All patients were photographed before and after treatments for documentation.

Picture 1: *1: MeDioStar 810nm*
2: MeDioStar miXT with the same fluence level like MeDioStar 810nm
3: MeDioStar miXT with higher fluence

Discussion:

So far we have very preliminary results after the first treatment.

The biggest difference between the two lasers was in the discomfort (pain) score. All patients rated the treatment with the MeDioStar miXT as having lower pain than the MeDioStar 810, even with the higher fluence. The average pain score for the MeDioStar 810 was 2.2, with a range from 1 to 3. The average pain score for the MeDioStar miXT was 1 at the same fluence as the MeDioStar 810 and 1.4 at the higher fluence.

Two patients with really dark skin experienced pigmentation changes, both with the MeDioStar 810. However, it was notable that neither of these patients experienced any pigmentation changes with the MeDioStar miXT, even at the higher fluence. Both of these patients also experienced edema, in the areas treated with the MeDioStar 810 nm.

In terms of burned hair, all patients and doctors did not notice any burnt hair with the MeDioStar 810 and the MeDioStar miXT, but three patients noticed some burnt hair with the MeDioStar miXT, at the higher fluence.

Erythema scores were similar for both lasers, and were more related to the skin cooling post laser, than with any laser effect.

This was a really preliminary study, and we will continue the study refining the parameters based on our experience gained from this study.

Conclusion

In our very preliminary study, we have clearly noticed the side effect difference between the two lasers, with the MeDioStar miXT causing less pain, edema and pigmentation changes in dark skin. We will continue to take this study forward to see if there is a difference in the efficacy of the two lasers.