

# Fractional Treatment of the Face with the CO<sub>2</sub> Laser

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## Background

During the 1990s, ablative CO<sub>2</sub> lasers were the gold standard for skin resurfacing and the treatment of scars, wrinkles and sun-damaged skin. As a less invasive alternative with fewer side effects and shorter downtime, the Er:YAG laser became the system of choice. Unfortunately, the treatment results regarding the smoothing of wrinkles are not as good as those achieved by a CO<sub>2</sub> laser.

Side effects and downtime have been further reduced through the use of non-ablative laser systems. These systems induce heat in underlying dermal structures without damaging the skin surface. This effect is intended to stimulate the remodeling processes in the dermal layer, thus achieving tightening effects. However, compared to ablative skin resurfacing, the effectiveness is limited.

Fractional non-ablative laser systems have provided even better results. They achieve a stronger thermal effect on the tissue, limited to microscopically small column-like necrosis zones (“Microscopic Treatment Zones”, MTZ). However, the results of this procedure are also not as good as those achieved by ablative skin resurfacing.

The optimal balance between good clinical results and minimal side effects seems to be achieved by fractional ablative laser systems. The concept of fractional laser therapy is applied on ablative laser technology such as CO<sub>2</sub>- or Er:YAG laser therapy. Fractional ablative laser therapy is effective in sun-damaged skin and scars, e.g. acne scars. Side effects and downtime are significantly lower than those of standard (non-fractional) ablative laser systems. When aging skin is treated, a clear reduction of wrinkles and particularly an improvement of elastosis and hyperpigmentation can be expected.

## Example of a treatment with the fractional CO<sub>2</sub> laser (EXELO<sub>2</sub>, Quantel Derma GmbH)

In four sessions performed every 3 – 4 weeks, the full face of a patient is treated with a fractional CO<sub>2</sub> laser system. Microscopically small channels of ablation are created. The surrounding unaffected skin contributes to a fast epidermal healing.

## Treatment Parameters

The treatment results, side effects and downtime depend on the selected energy level and the distance between the MTZ (= spot density). To protect the skin, the skin is cooled by an attachable cold air device. The treatment parameters are chosen individually according to the indication, location and skin characteristics. The patient in this example was treated on the forehead and cheeks with an energy setting of 40 mJ, pulse duration of 2 – 3 ms and a spot density of 250 – 300 pts/cm<sup>2</sup>. For the periorbital region, the parameters were reduced to an energy level of 30 mJ, a pulse duration of 2 ms and a spot density of 200 pts/cm<sup>2</sup>.

## Clinical Pictures



Pronounced elastosis and deep wrinkles on the face of a 65-year old patient before the first session



Significantly improvement of elastosis and wrinkles 4 weeks after 4<sup>th</sup> session with a fractional CO<sub>2</sub> laser (EXELO<sub>2</sub>, Quantel Derma GmbH)

## Treatment Results

As can be seen in these figures, there was a visible improvement of elastosis and wrinkle depth after only four sessions with the CO<sub>2</sub> laser.

## Summary

The clinical application of the fractional CO<sub>2</sub> laser shows a clear reduction of wrinkles. In particular, the elastosis and hyperpigmentation was visibly improved after several sessions. The best results are visible several weeks after the therapy, due to the time necessary for the remodeling processes of the collagen.

Downtime varies between 3 to 10 days, depending on the selected laser parameters. Side effects such as scars, or hyper- and hypopigmentation rarely occur. In any case, herpes prophylaxis is recommended.

The treatment method described above is currently being evaluated at the Department of Dermatology, University of Regensburg, Germany in a prospective controlled monocentric study.