

# What is the difference between laser and HIFU tattoo removal?

Over the last decade, lasers have become the standard equipment and method for tattoo removal. Despite the gradual technical advances, there are however still significant drawbacks and fundamental limitations in the method.

TOOsonix offers an alternative HIFU method, which in some cases can replace lasers entirely, and in other cases offer a complementary solution for particular colors and areas. In yet other cases HIFU is directly unsuitable and should not be used.

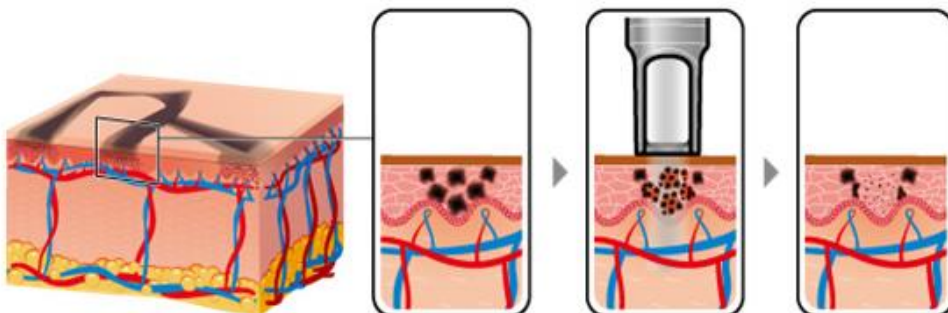
It is therefore important to know and understand the fundamental function and dynamics of the different methods and equipment. Below is a short summary of the main functionalities of the two methods, and a table with comparison of the key parameters. If you are interested in more information on this, please ask for our detailed whitepaper on this topic.

## Laser tattoo removal

The overall method of laser tattoo removal relies on absorption of light energy and subsequent mechanical breakdown of individual pigment particles positioned in the upper part of the dermis layer.

Provided the laser has the right penetration depth and a wavelength that can be absorbed by the pigment color in the skin, each individual pigment particle undergoes a rapid thermal and mechanical expansion. This sudden expansion and mechanical impact induces high shear forces in the particle. If the shear forces are high enough, the pigment particle is broken into two or more fragments. If these fragments are small enough, they will gradually be removed by the human vascular and lymphatic system.

The laser method is therefore a gradual process of individual particle breakdown followed by internal transport of small fragments away from the skin surface during several treatment sessions.



### Dynamics of tattoo removal by laser.

Individual tattoo pigments are broken down due to shear forces induced by laser energy absorption.

Fragmented pigments are transported away from the skin via the internal vasculature and lymphatic system.

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## Frequently Asked Questions

### HIFU method

The overall method of HIFU tattoo removal is based on replacement and excretion of specific volumes of cells in thermal lesion points positioned in the upper part of the skin.

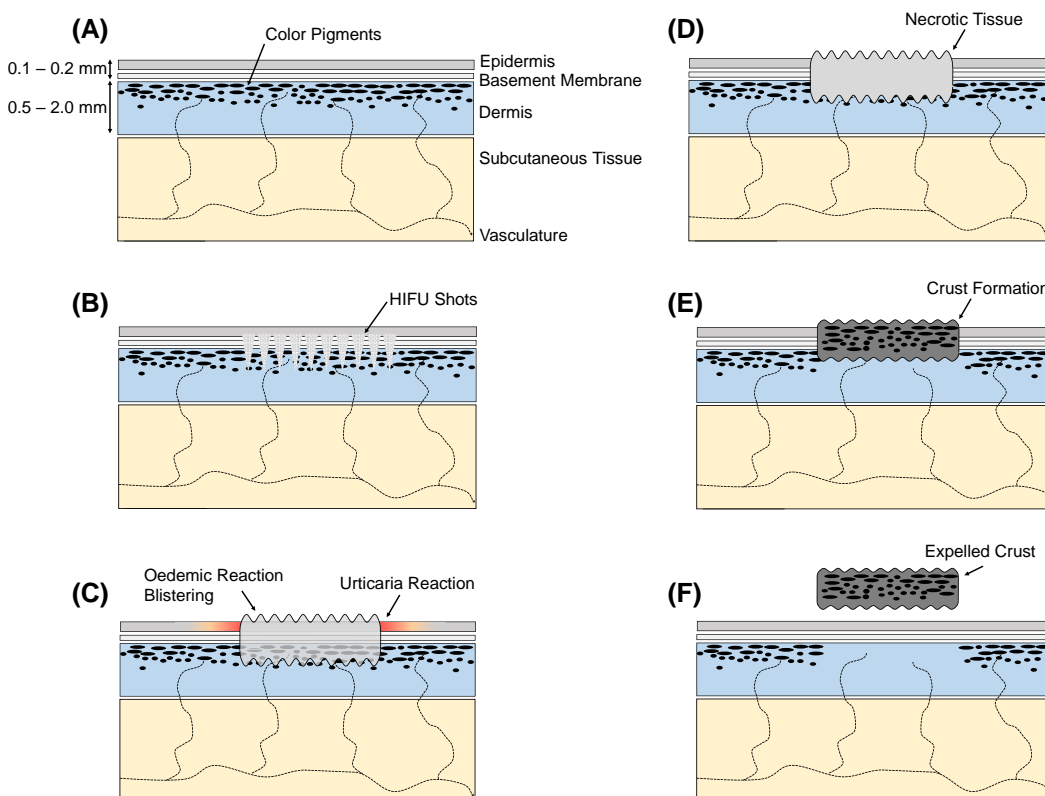
The HIFU method delivers a very controllable energy dose into a very accurate volume inside the epidermis, basal membrane and upper dermis.

If these lesions are closely positioned to cover a coherent area of a tattoo, the body's healing process will attempt to remove all foreign tattoo pigments and particles together with the other affected dead cells and tissue.

The cells and pigments will form a crust covering the surface of the treated area and gradually be excreted as new clean skin is created from below.

The method is therefore completely independent from pigment color, pigment concentration, ink type or any other content within the targeted volume.

The method furthermore has the benefit of being very effective in its way of removing pigments from the skin. A single treatment is often enough to remove all pigments for the treated area.



### Dynamics of HIFU tattoo removal.

A highly controlled volume is treated in the upper dermis.

The pigments are contained in a wound-crust.

The crust is excreted as the skin heals from below.

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## Frequently Asked Questions

	<b>Laser</b> <i>(Typical values and limits)</i>	<b>HIFU</b> <i>(Typical values and limits)</i>
<b>Overall removal functionality</b>	Gradual breakdown of individual pigments through energy absorption	Thermal lesion confined to specific volume in acoustic focal zone
<b>Pigment transport</b>	Internal transport into vasculature and lymph nodes	Excretion of crust to surface of skin
<b>Energy deposition into target area</b>	Dependent on energy absorption in pigments 0 – 1.0 J/shot @ 5 - 10 Hz	Fixed according to setting 0.5 – 1.0 J/shot @ 0.5 Hz
<b>Handpieces necessary</b>	4 (different wavelengths)	1
<b>Handpiece replacement</b>	Fixed shot count Typically 50,000 shots	Fixed energy credit 30 kJ correspondent to ~50,000 shots
<b>Treatment capability</b> Color restrictions Pigment restrictions Over-tattoo restrictions Shaded area restrictions Large area restrictions	Green, Red, White/Light, Fluorescent Large particles. Inorganic pigments Yes - High risk of burn wounds None – Well suited None – Well suited	None – Color independent None – Pigment independent None – Concentration independent Yes - Not well suited Moderate - Checker-board strategy
<b>Typical number of sessions</b>	PicoLaser: 6 – 10 sessions Q-Switched: 8 – 15 sessions	Small tattoos: 1 session Large tattoos: 3 – 4 sessions
<b>Re-treatment interval</b>	6 – 8 weeks	Min 12 weeks
<b>Main risks and hazards</b> Pain during treatment Pain after treatment Burn damages Infection Scar formation Allergic reaction	Very high High Moderate Moderate Moderate Moderate	Low (painless with pain relief cream) Low None Moderate Moderate None