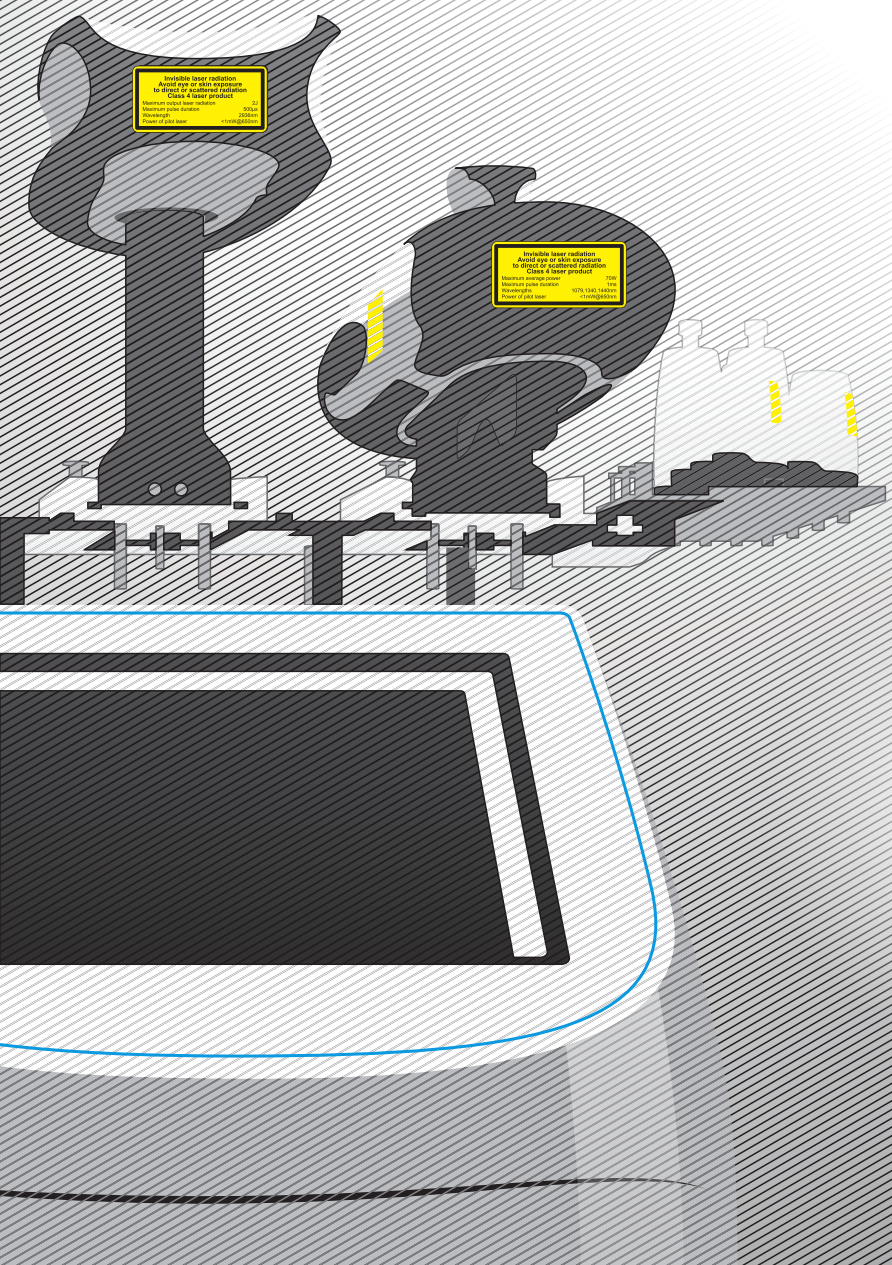
LINLINE

life changing lasers

Treatment of septic and chronic wounds with a new "RecoSMA" laser technology



MEDICAL SYSTEMS
LINLINE

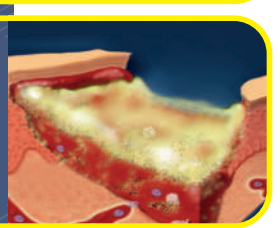
Why choose

LINLINE laser technology for Wound Healing?

Pain-free treatment

Fast and gentle wound bed cleaning, safe for viable tissues

Regenerative technology; induces neo-angiogenesis



Significantly reduces the time of healing as compared to conventional methods

No antibiotics or antiseptics as pathogenic flora is eliminated by laser

Mono method; no need for any other treatments or special dressing

The total cost with RecoSMA is grossly less than hospitalization

Wound Healing – by Tissue Proliferation, not by Contraction!

LINLINE's

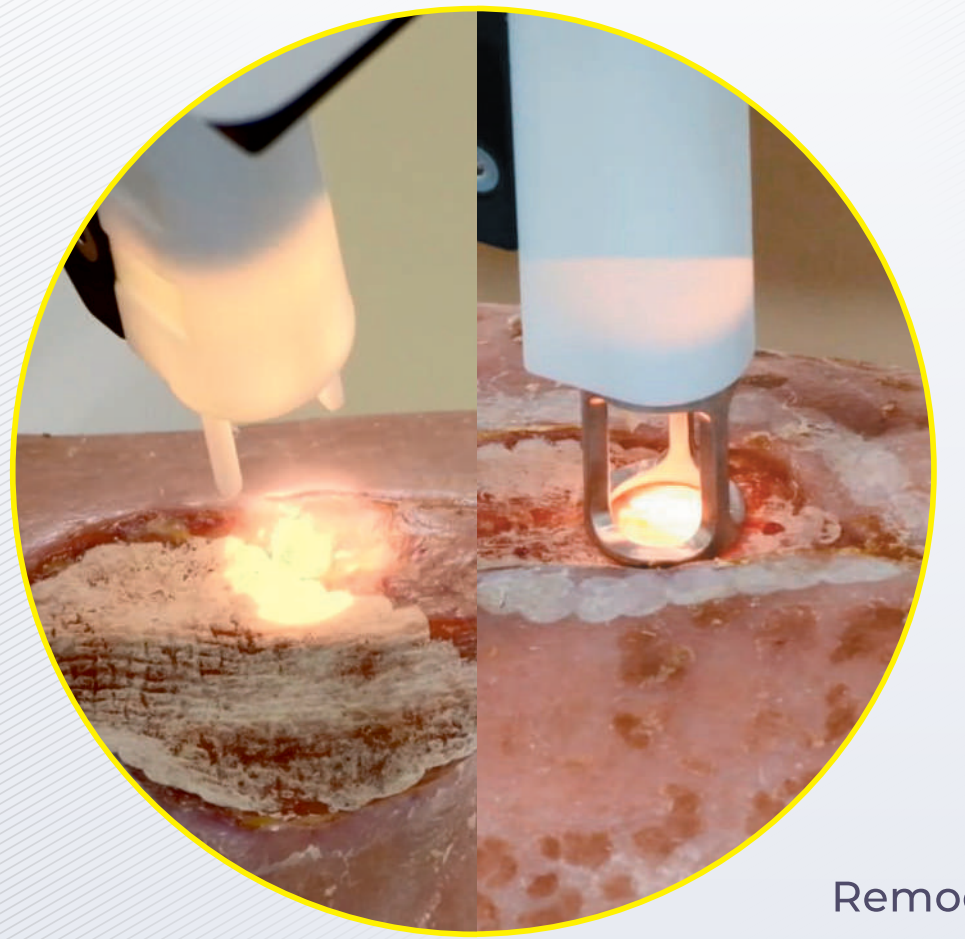
two-step approach

for Septic and Chronic Wounds Treatment

Step 1.

Wound Debridement
by High-Energy Erbium Laser

- Eliminates bacteria
- Removes necrotic detritus
- Constructs a healthy wound bed
- Doesn't affect viable tissues
- Easy visually-controlled



Step 2.

Reparative Regeneration Stimulation
with RecoSMA —
the patented technology of LINLINE

- Enhances trophism
- Stimulates neoangiogenesis
- Triggers rapid tissue growth
- Repairs functional tissues
- Remodels without scarring

Wound Debridement:

the pro and cons

Debridement plays a vital role in wound bed preparation, removing barriers that impair wound healing:

- ✓ *Helps to remove non-viable tissue;*
- ✓ *Controls inflammation or infection;*
- ✓ *Decreases excess moisture.*

Currently, several methods of debridement are employed (including surgical, mechanical, chemical, etc.), each with their own set of drawbacks, such as:

- ✗ *Slow process*
- ✗ *Unsuitable for frequent use*
- ✗ *Damages living tissue*
- ✗ *May harm adjacent tissue*
- ✗ *Causes bleeding and discomfort*

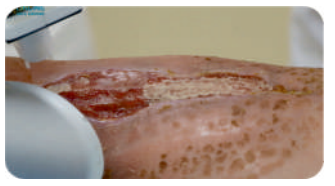
How does the Erbium laser work?

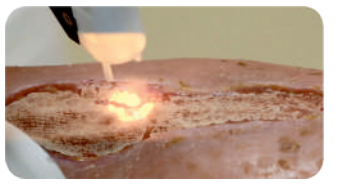
The pulsed Er:YAG laser emits light with a wavelength of 2940 nm corresponding to the water absorption peak. Because 90% of the soft tissue is water, most of the laser energy is superficially absorbed.
Each pass of the erbium heats tissue to over 300°C. As a result, the water in the tissue is rapidly expanded to eject the charred debris from the wound surface without leaving behind a necrotic eschar.
What is essential, viable tissues remain safe since their high content of water (blood in capillaries) acts as a natural barrier to the Erbium laser radiation - all the energy absorbs in a very superficial area.

Advantages

of Erbium laser debridement:

- ✓ *Precision and uniformity of tissue ablation;*
- ✓ *Painless treatment;*
- ✓ *Zero risk for viable tissue;*
- ✓ *Done as frequently as needed;*
- ✓ *Easy to perform;*
- ✓ *Low operating costs;*
- ✓ *No special dressing.*





RecoSMA:

True Innovation

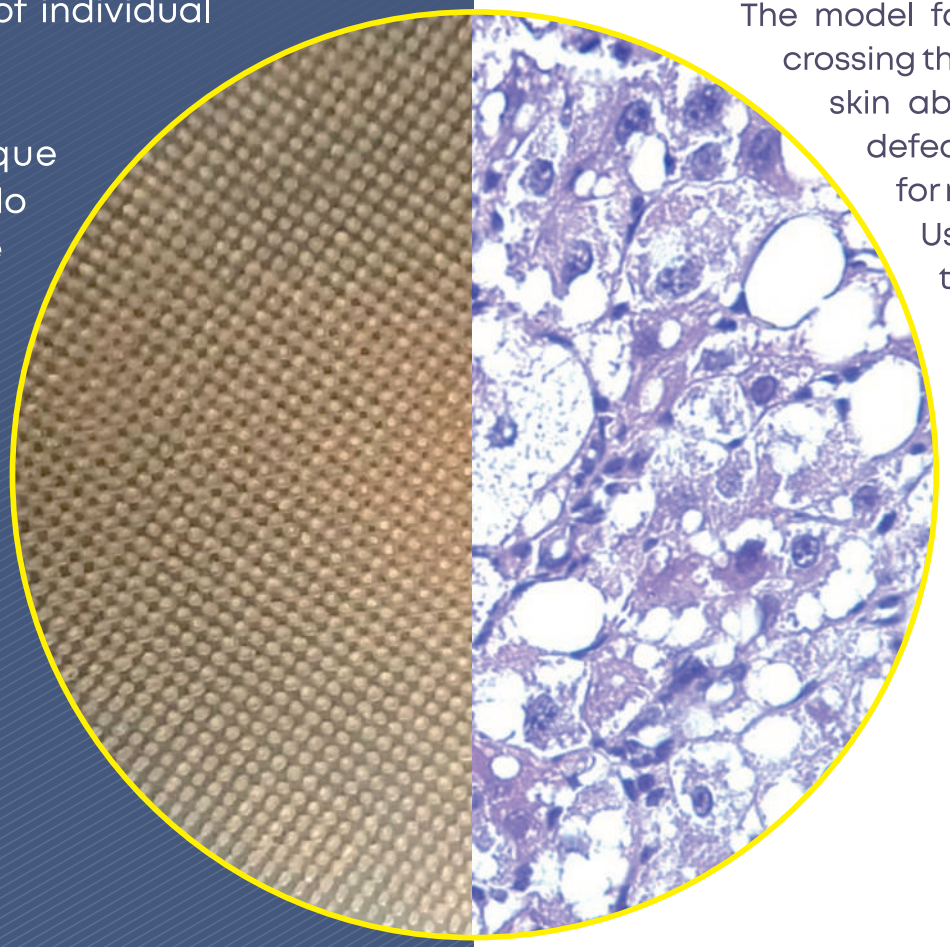
RecoSMA® is a novel technology developed and patented by LINLINE.

For many years, we aimed to achieve reparative regeneration of soft tissues; without fibrosis formation, that is, to have functional tissue instead.

Ultimately, we have created a specific impact human tissues have never encountered: laser-induced explosive waves, creating non-thermal destruction affecting membranes and nuclei of individual cells.

It became real due to the unique features of laser radiation, which do not occur naturally - as people invented this tool.

Next, we conducted extensive preclinical and clinical studies on various tissues - skin, soft tissues, mucous membranes and even internal organs.



Pre-clinical studies:

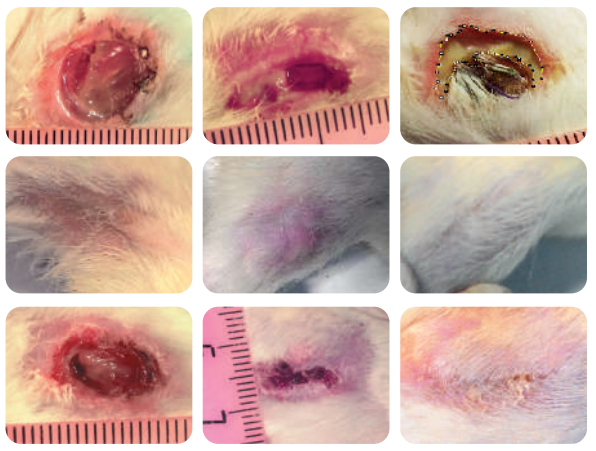
Liver cirrhosis

Liver cirrhosis was induced in rats using carbon tetrachloride. Repeated operations treating the liver have been followed by exclusion from the experiment and histological examination of the liver. The cirrhotically changed liver regeneration signs were:
- Neoangiogenesis.
- The proliferation of the bile ducts.
- Significant reduction of false lobules and connective tissue structures.

Neurotrophic ulcers

The model for neurotrophic ulcers was formed by crossing the sciatic (femoral) nerves and forming a skin abnormality. Without the treatment, the defects didn't heal while under observation for more than one month.

Using the RecoSMA allowed us to close the defect within two weeks, forming healthy and functional skin with no signs of scarring.



RecoSMA:

how does it work?

What is outside?

You can notice only small micro ablation zones on the surface; they do not exceed 50 microns, less than a human hair in diameter.
They do not threaten living tissue, as the ablation depth is insignificant.
Patients feel no pain or discomfort.

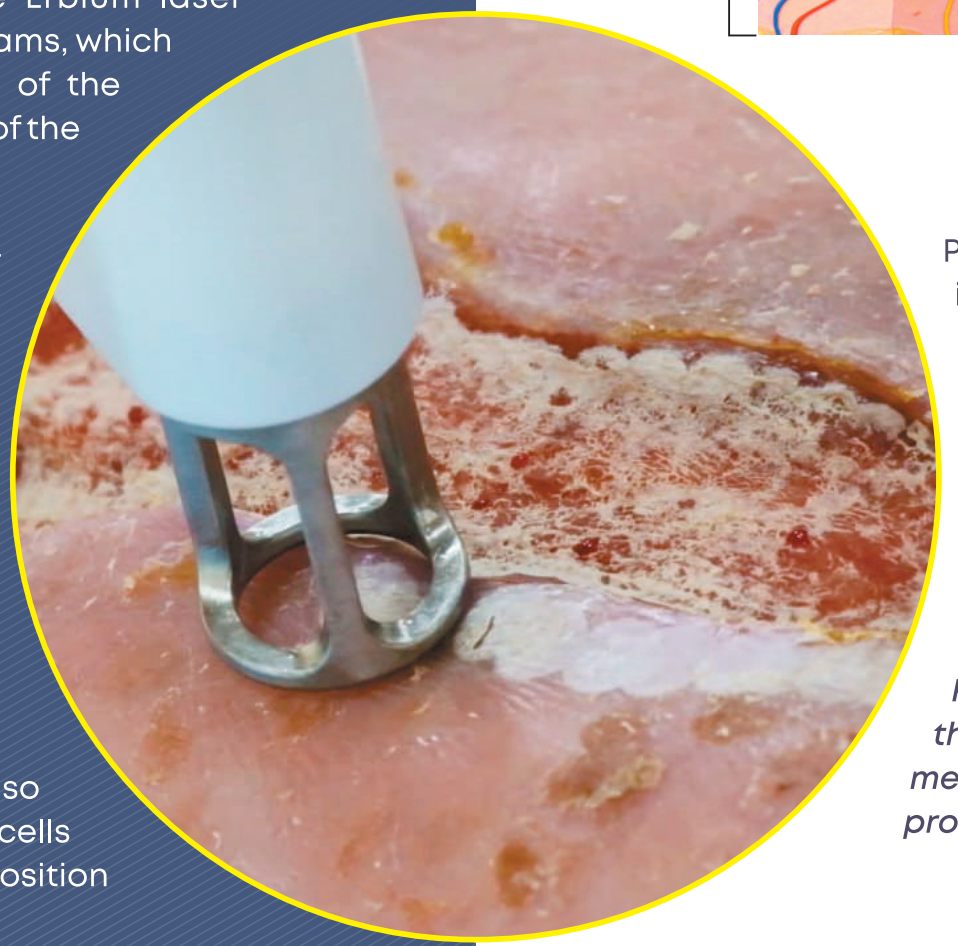
What happens inside?

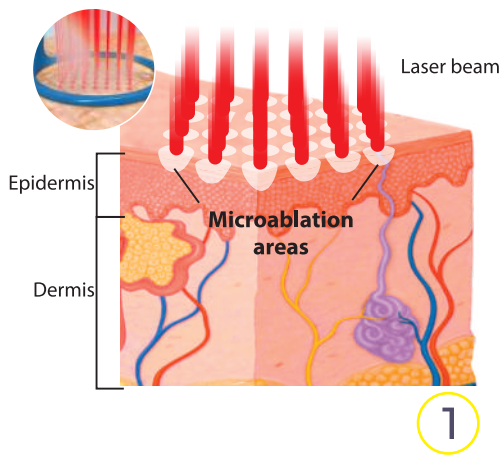
Using a patented SMA module, the Erbium laser radiation is redistributed into microbeams, which together create a periodic structure of the stress wave epicentres on the surface of the irradiated tissue (Pic.1-2).

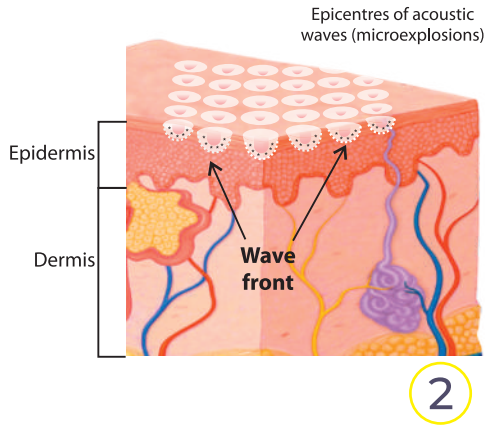
Absorption of a short Erbium laser pulse creates mechanical stress waves that propagate out of the laser-irradiated site into the surrounding tissue (Pic.3).

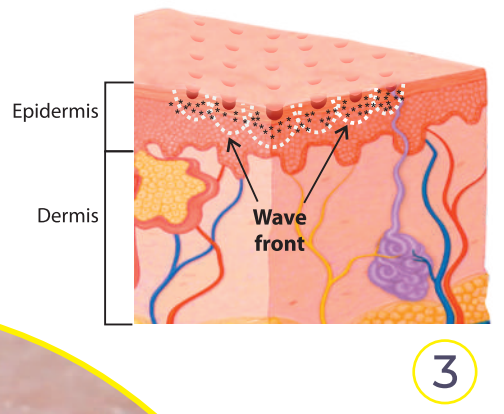
Changing the energy and duration of laser radiation pulses makes it possible to vary the power of these waves, thereby influencing the depth and degree of microtrauma.

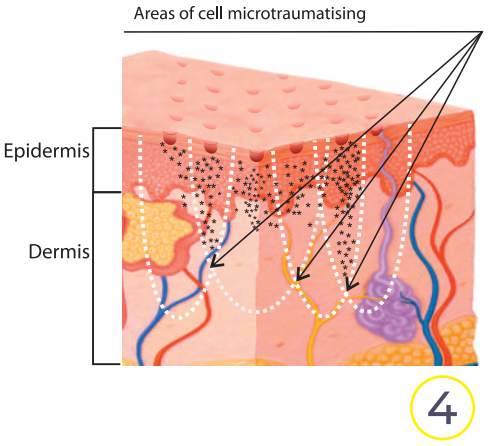
The laser radiation parameters are set so that the mechanical damage to tissue cells is induced only at the points of superposition of several stress waves (Pic.4).











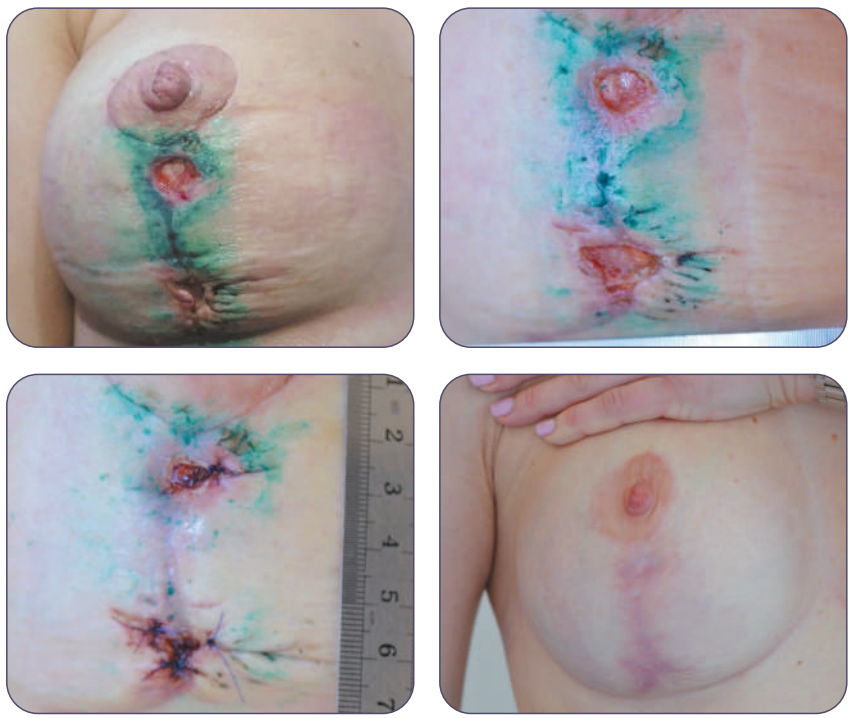
Powerful acoustic waves, upon interference with each other, create zones of microinjury to a depth in the tissue of up to 6 mm.

This non-thermal destruction specifically targets membranes, nuclei, or individual cells, without causing extensive injury to surrounding areas.

RecoSMA treatment triggers a response that enhances microcirculation, metabolism, and tissue trophism, thereby promoting tissue repair.

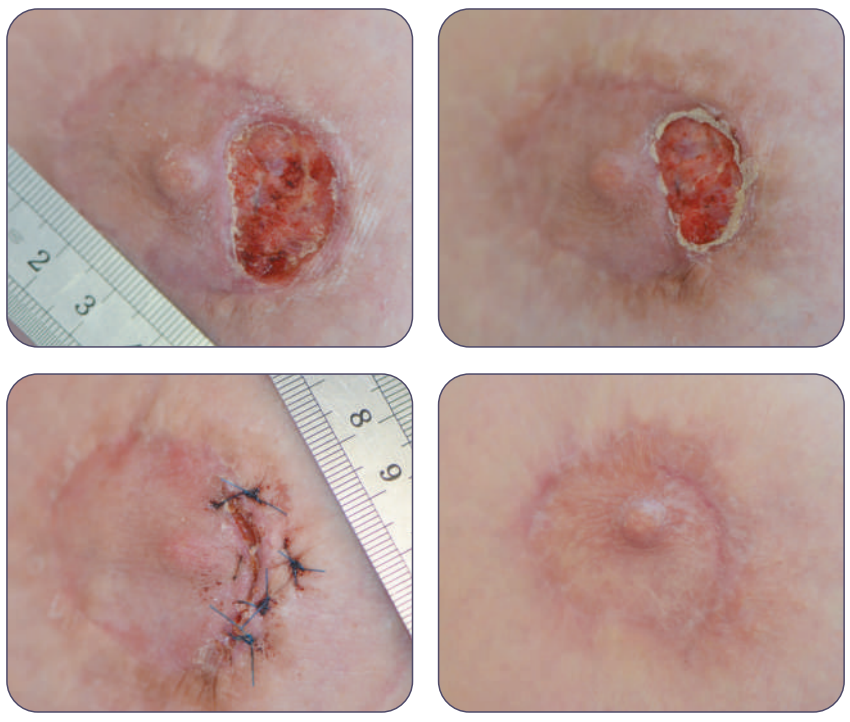
Clinical cases

F, 31, Non-healing wound after mastopexy. 5 sessions.



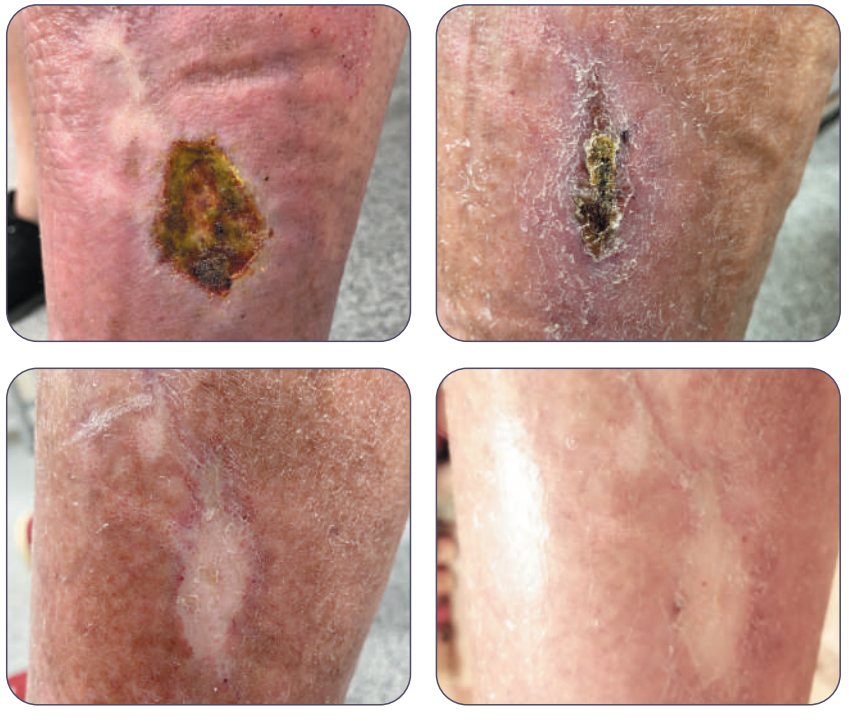
M, 60, Non healing burn wound of 2 months. 2 sessions.

F, 33, Wound dehiscence after plastic surgery. 2 sessions

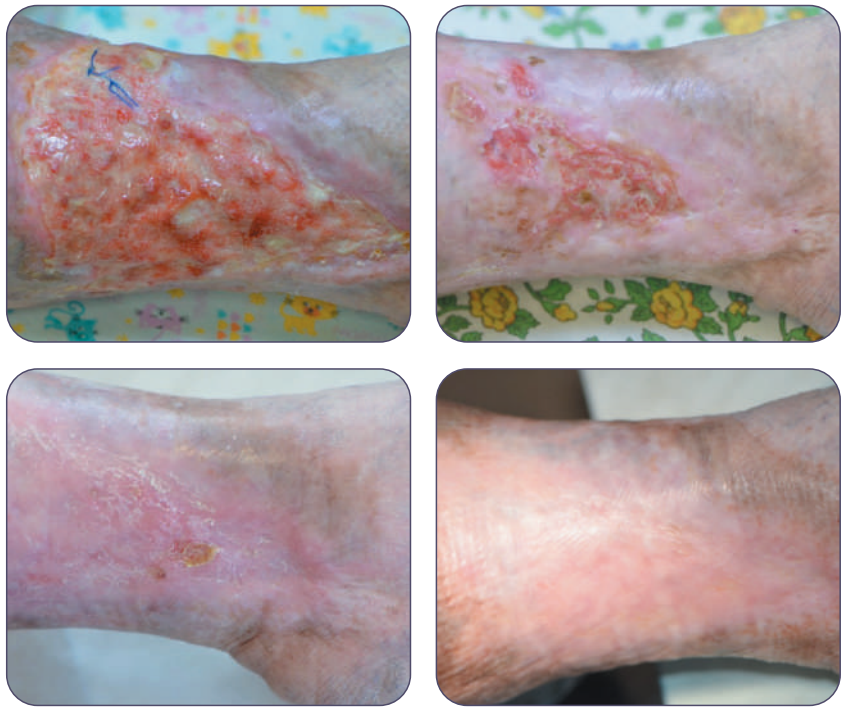


M, 56, Frostbite in hands. 12 sessions

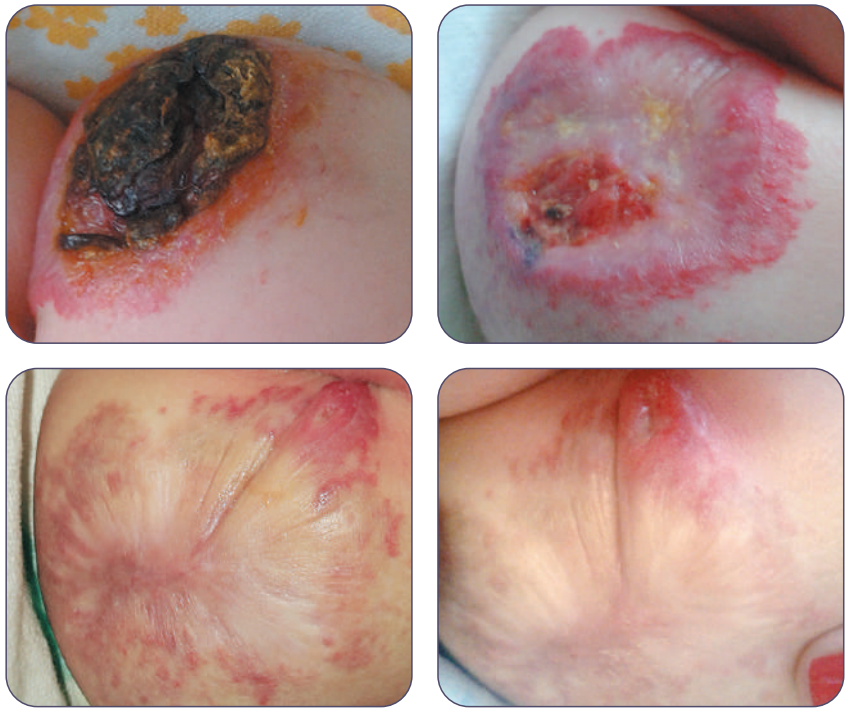
F, 58, Trophic ulcers, vasculitis. 14 sessions.



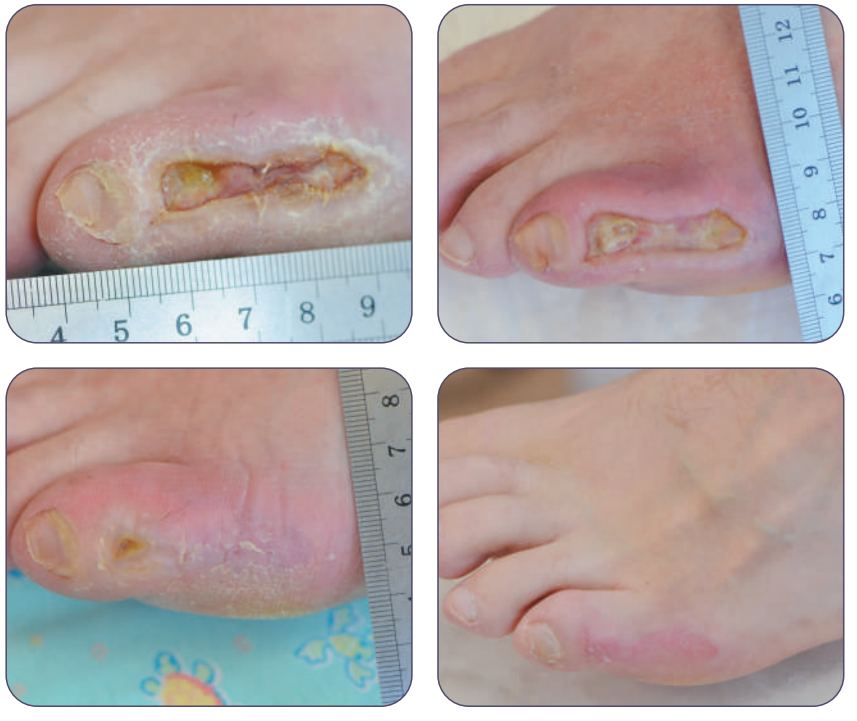
F,67, Venous leg ulcer, type 2 diabetes. 14 sessions



F, 5 months, Ulcerated Infantile hemangioma. 11 sessions

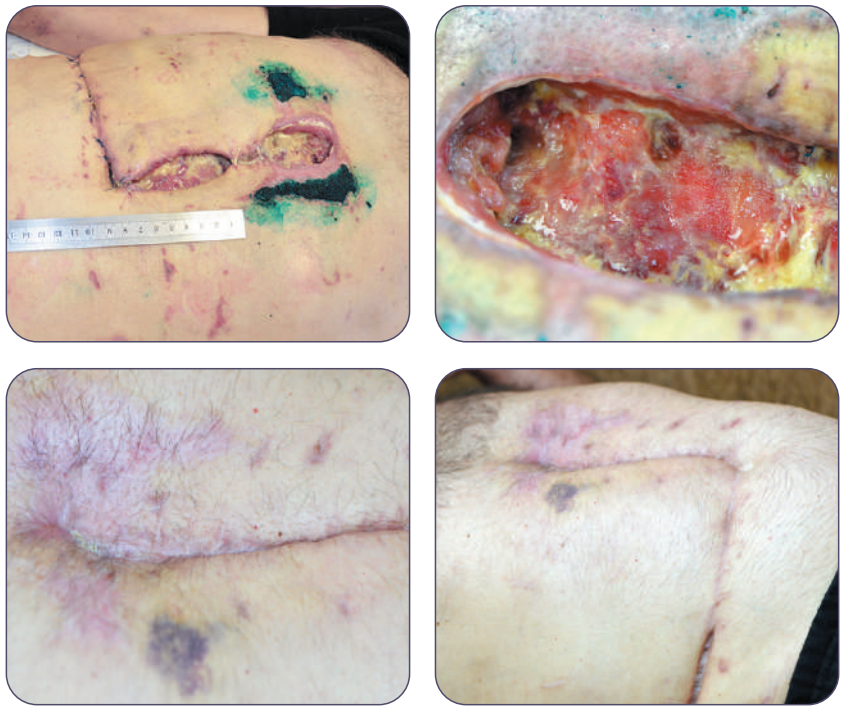


M, 37, Diabetic ulcer. 8 sessions



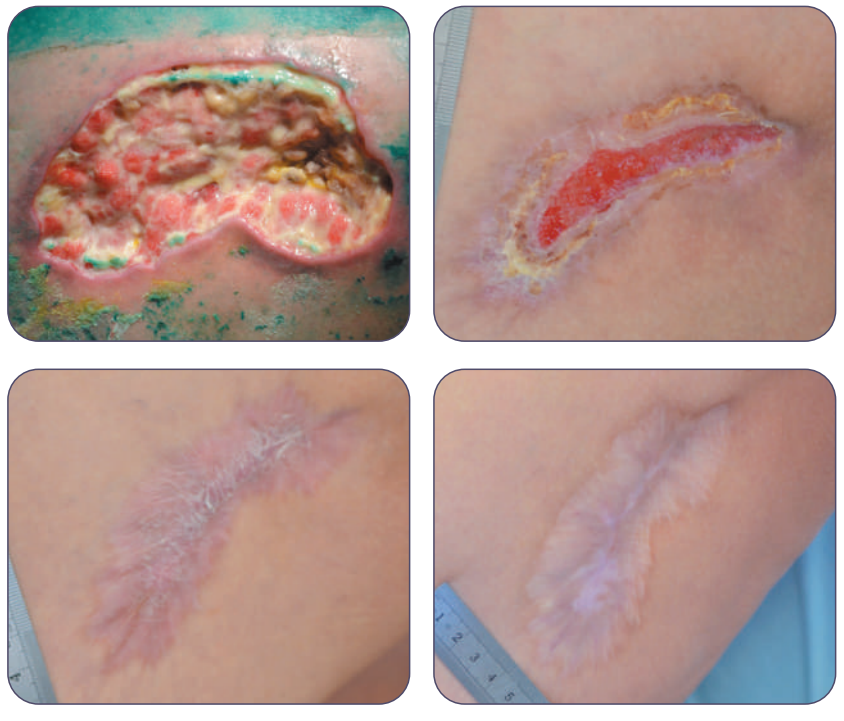
F, 31, Posttraumatic neurotrophic foot ulcer. 26 sessions

M, 45 Wound dehiscence after resection of the liver and relaparotomy. 9 sessions.

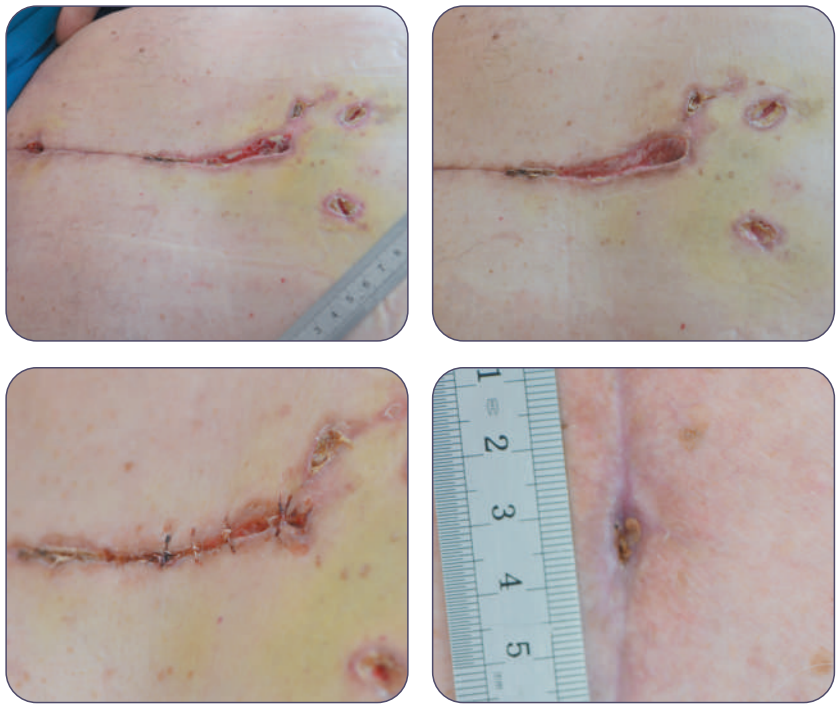


M, 36, Trophic ulcer, chronic osteomyelitis. 5 sessions

F, 28, Leg Ulcer in Budd-Chiari syndrome. 4 sessions



M, 65, Long-term non-healing sternal wound (coronary bypass surgery). 8 sessions



F, 16, Pressure ulcer, 6 sessions

MULTILINE

High-energy Laser System

We have combined the results of 25 years of research and development of laser technology into a single laser platform. MULTILINE is a unique medical laser system with an integrated universal power and control system with compact laser emitters. The device's innovative design enables the replacement of laser emitters, which alters the device's profile and transforms it into a different tool.

Technical parameters

Active medium	Nd:YAP/KTP /Q-Switched Laser for vessels	RUBY Ruby laser	Alex Alexandrite laser	Nd:YAP 3-wavelength long pulse Laser scalpel	Nd:YAP/ Q-switched Laser epilator	Er:YAG Erbium laser	Er:YAG SMA module
Wavelength	1079 / 540 nm	694 nm	755 nm	1079/1340/ 1440 nm	1079 nm	2936 nm	2936 nm
Fluence	10-40 J/cm^2	3-30 J/cm^2	3-30 J/cm^2		up to 80 J/cm^2	5-30 J/cm^2	2-5 J/cm^2
Pulse energy	up to 5 J	0,3-2 J	0,3-2 J		up to 7 J	0,3-2 J	0,3-2 J
Repetition rate	5 Hz	5 Hz	6 Hz	100 Hz	5 Hz	10 Hz	4 Hz
Pulse duration	10 ns-5 ms	40 ns-2 ms	70 ns-2 ms	0,2-1 ms	10 ns-5 ms	0,2-0,5 ms	0,2-0,5 ms
Emitting power				up to 70/40/15 W			
Spot size	5 mm	3; 5 mm	3; 5 mm	500 µm	4; 8 mm	3; 4 mm	5 mm
Microspot size							50 µm
Microbeam density							up to 10000/cm^2

LINLINE MEDICAL SYSTEMS SIA

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