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DIAMAGNETIC THERAPY®

A Revolutionary Therapy

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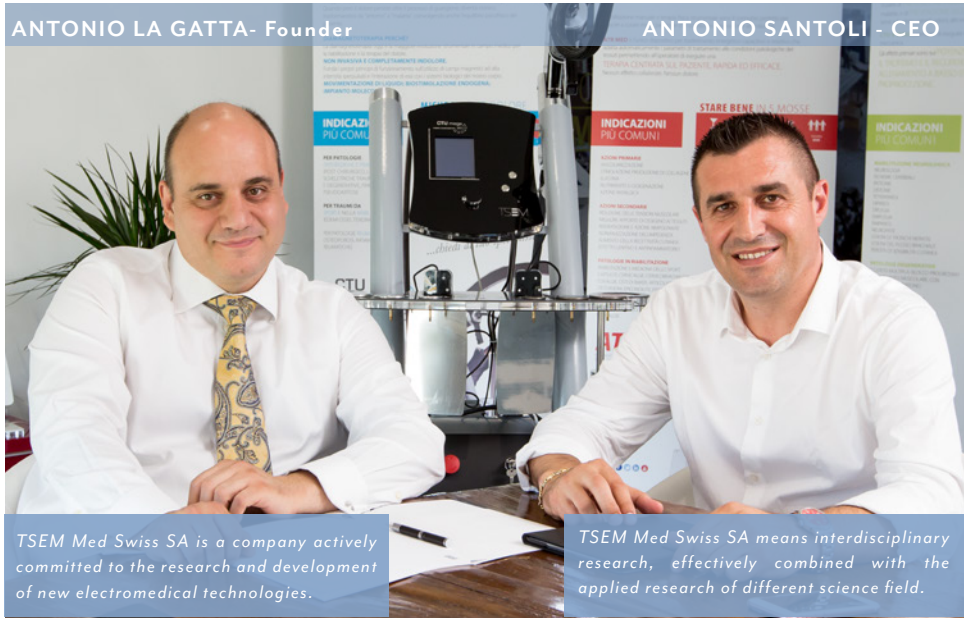
BUILT ON
FUTURE TECHNOLOGY

DIAMAGNETIC THERAPY

HEALTH AND SCIENCE



TSEM mission is that of conjugating innovative ideas with the development of modern technologies, which effectively support the diagnostic and rehabilitative medicine, without any invasive approach.

Antonio Santoli

OUR STRENGTH LIES ON

Research, as a strategic resource for physicians and healthcare professional dedicated to the therapy and rehabilitation of patients. Successful applied science is our priority.

Technology, developed in complete synergy with the operator's experience, which leads us to create new tools that guarantee rapid and successful treatment in complete safety.

Innovation, carefully designed in support of human experience, and the enrichment of professional training within the medical field, for a better relationship terapist - patient.

Diamagnetic therapy

Designed with future technology

The use of diamagnetic materials combined with the effect of the magnetic field.

High intensity magnetic fields as an innovative therapeutic instrument.

Administering drugs through the DMA system eliminates the need to resort to traditional systems.

Diamagnetic therapy is a non-invasive therapeutic method based on the repulsion mechanisms generated by the forces of high intensity magnetic fields. When subjected to the action of a magnetic field, the electronic structure of diamagnetic materials undergoes molecular movement in opposite direction to the field itself.

High intensity magnetic fields can trigger cellular re-adaptation to positive physiological response in many pathologies affecting the muscular-skeletal system and significantly reduce treatment times while improving in the quality of life for patients.

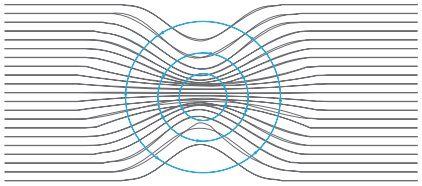
Also known as DMA (**diamagnetic molecular acceleration**), diamagnetic therapy offers an original way to provide drug treatment that allows the completely painless administration of active principles without the use of needles or electric current.

Magnetic properties of materials

Materials and substances *are classified on the basis of their magnetic properties as ferromagnetic, paramagnetic, and diamagnetic. The physical characteristics of the latter constitute the foundation of diamagnetic therapy.*

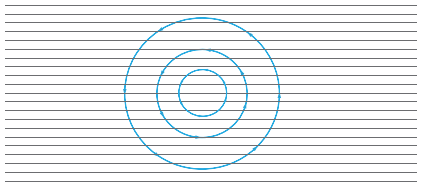
Ferromagnetic substances are attracted to an external magnetic field. Unlike diamagnetic and paramagnetic substances, a ferromagnetic material's relative magnetic permeability is not constant when fields are varied.

μr>0 ferromagnetic



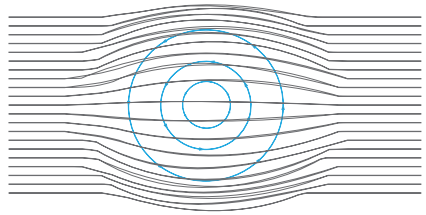
Substances defined as paramagnetic remain neutral in the presence of an external magnetic field because the respective forces of attraction and repulsion balance each other out.

μr= 0 paramagnetic



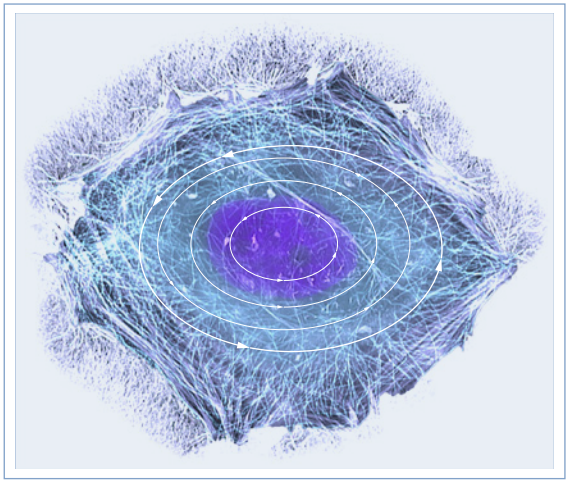
When a diamagnetic substance is invested in a magnetic field, it reacts by weakening the external field with a slight magnetic movement in the opposite direction to the field itself, in this way creating an effect of repulsion.

μr< 0 diamagnetic



Relative magnetic permeability (μr) is related to **vacuum magnetic permeability** (μ0) in order to represent the ease with which magnetic forces propagate in a vacuum.

The repulsive force generated by the diamagnetic effect is very weak and **is appreciable only when the magnetic field is very intense.**



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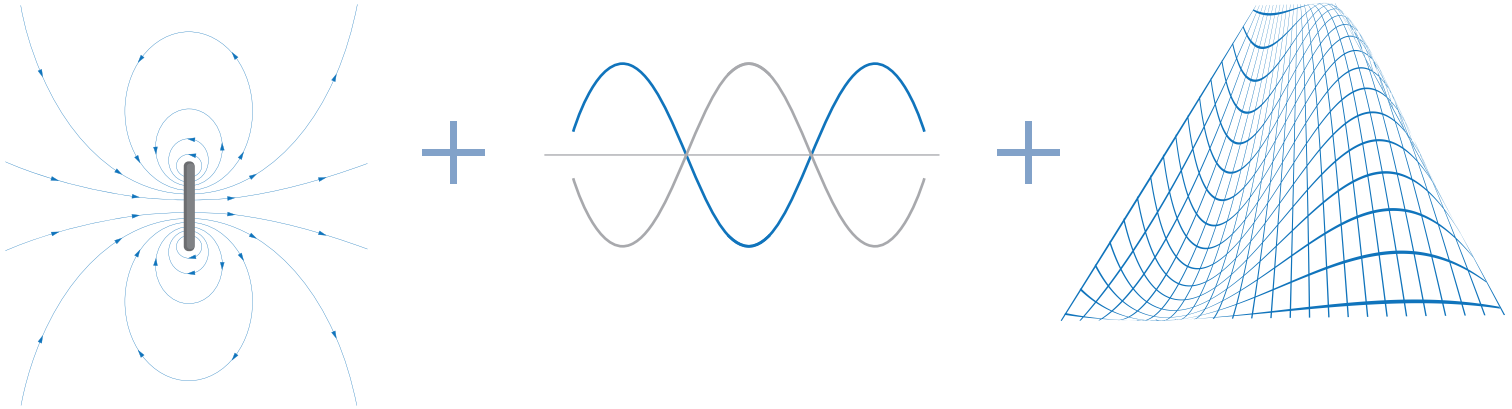

HIGH INTENSITY: **2 Tesla**
It produces the diamagnetic effect

LOW FREQUENCY: **7 Hz**
It avoids damages of biological tissue

SELECTIVE AMPLITUDE: **adjustable**
It allows selective stimulation of tissues

The physics *of high intensity and low frequency magnetic fields, combined with the selective amplitude of the field's gradient is the technological basis of diamagnetic therapy.*

YES, OF COURSE, BUT...

Why 2 Tesla? → Because the diamagnetic effect on water molecules that triggers the movement of liquids is made possible by the magnetic field's high intensity.

Isn't a magnetic field of such high intensity dangerous? → No, it isn't, because the field's 7Hz frequency is very low, therefore the energy generated is not ionizing and does not damage tissue.

How does an electric current generated by a magnetic field differ from the electric current generated by a radio frequency? → A magnetic field's electric current is generated completely inside the tissue and is isotropic, or rather, equal in every one of its points, both at the surface and deep down.

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Magnetotherapy VS Diamagnetic therapy

Magnetotherapy		Diamagnetic therapy
Just a conductor of the electrical flow	The role of the water element	Basic costituent of the therapy
100 gauss	Field intensity	20.000 gauss
NO	Effect on liquids	YES
NO	Treatment of pathology in the acute phase	YES
4 hours	Average time per session	15 minutes
(Non-selective current) NO	Selective apmlitude adjustable	YES (Selective current)
45	Average of treatment sessions	15

The characteristics *of intensity of the magnetic field and the pulse emission mode make diamagnetic therapy different from conventional magnetic therapy.*

"Electromagnetism is something impalpable. Our senses perceive only an infinitely minute part of the order of less than one trillionth. This means that if the electromagnetic spectrum were an entire stretch of beach, we would perceive the existence of just one grain of sand. Yet that infinitely tiny band of the spectrum gives us some of the deepest emotions of our lives: a sunset, the spectacular colors of a flower, a beloved person's face. I can't even imagine how it would be to appreciate even only a little bit more.

However, the other areas of the spectrum are no less important for us, and assist us in our day to day lives, making the telephone, television, and internet work, curing us of disease. From the immense magnitude of the electromagnetic spectrum, humans have fashioned instruments capable of "seeing" all the way from nanometers (0.000,000,001 m) to hundreds of thousands of kilometers (300,000,000 m); here, the CTU occupies a special, far from anonymous place on the electromagnetic spectrum, a place where functional structures of our body can "feel" its effects. And that's where it belongs!"

Tony

eng. ANTONIO LA GATTA
TSEM - Founder

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DIAMAGNETIC THERAPY
TECHNOLOGY AND TOOLS

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CTU mega

DIAMAGNETIC PUMP 20

CTU MEGA 20

DIAMAGNETIC PUMP

The technology is safe *because the energy associated with the field is too weak to break molecular bonds.*

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Technical Features

Power supply
50-60 Hz 230 Vac

Corrent consumption
9,5 A

Power consumption
2200 VA (800 W)

Conversion factor
0,36

Operating frequency
1 Hz – 7 Hz

Type of emission
impulse

Atmospheric pressure
from 700 to 1000 hPa

Cooling system
Liquid

Dimension
84 x 80 x 163 cm

Weight
100kg - indicativi

Operating room temperature
Da 10 °C a 30 °C

Field generator
electromagnetic coil

Diamagnetic Complex Cream
Neutral conductive lotion formulated to heighten electric conductance.

The CTU Mega 20 magnetic field has a high intensity of up to 2 Tesla with a gradient < 400T/s.

The intensity of the field generates a visible diamagnetic effect on the materials; the elevated gradients induce current in the tissues.

The possibility to modulate the magnetic field's gradient also permits the generation of a wide frequency range in the current induced in biological tissue.

Thanks to the diamagnetic effect, the magnetic field generated by the CTU Mega 20 is capable of influencing body fluid dynamics.

Diamagnetic therapy
Mechanisms of action

Water is one highly diamagnetic substance, but so are many other organic substances, such as lipids and most plasma proteins, which play key roles in human metabolism.
The repulsive mechanical force exerted by diamagnetic therapy interacts with these substance at both extracellular and intracellular level, promoting the resolution of edema and tissue healing processes.

- MOVEMENT OF LIQUIDS
- ENDOGENOUS BIOSTIMULATION
- PAIN CONTROL
- ADMINISTRATION AND MOLECULAR IMPLANT

CTU MEGA 20

DIAMAGNETIC PUMP

Diamagnetic therapy *acts on the intracellular and extracellular matrix, producing drainage, regeneration, and strong tissue biostimulation.*

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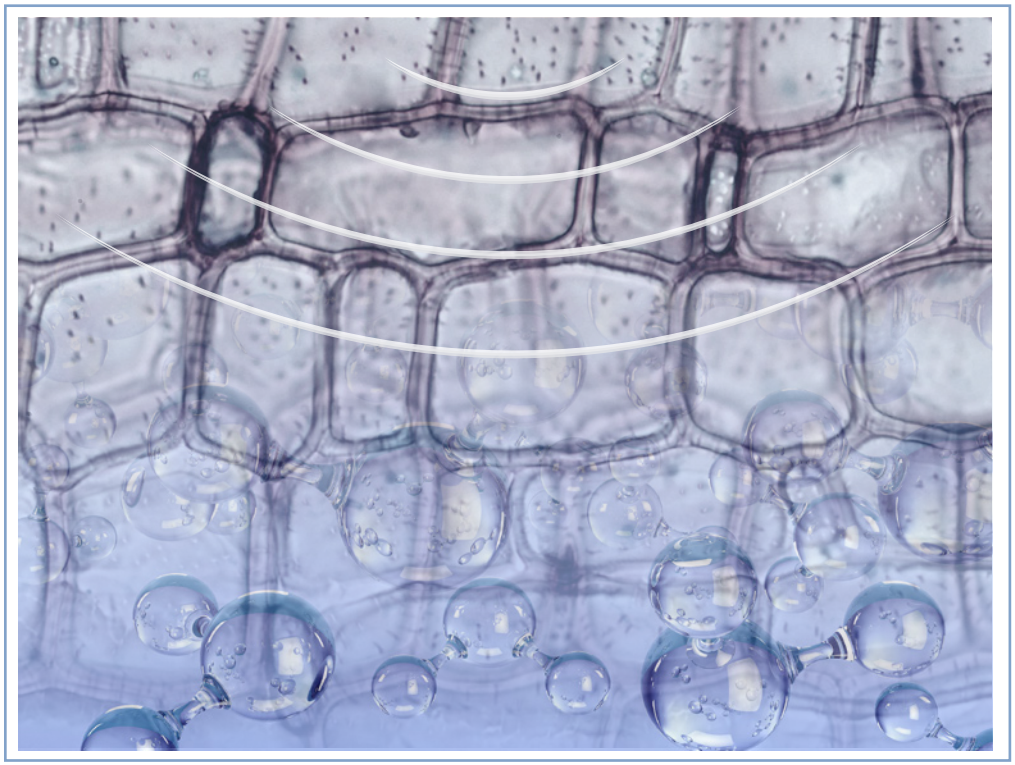


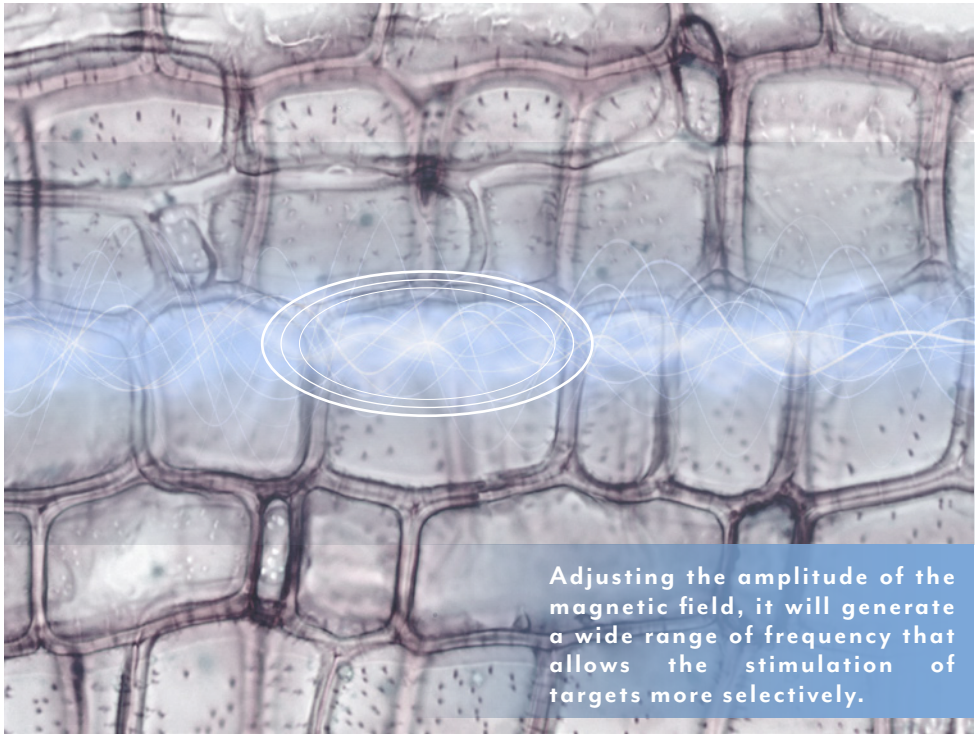
Movement of liquids

The degree of interaction between the diamagnetic pump and the human body's fluid compartments depends on the fact that the water is the medium in which all the body's biological reactions take place.

Intervening on the body's water and electrolyte balance means interacting with the systems responsible for maintaining osmotic pressure and electric potential, two aspects that are fundamental in many physiological functions such as neuromuscular activation and nerve impulse conduction.

The main effects of diamagnetic therapy on the extracellular and intracellular matrix regard the activation of the following fundamental biological functions:

- **fluid drainage**
- **nutrient and metabolite transport**
- **cellular homeostasis modulation**
- **tissue stimulation**

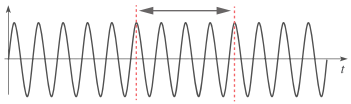


ENDOGENOUS BIOSTIMULATION

This stimulation is endogenous and isotropic, meaning that it is generated inside the organism and distributed evenly on both the surface and deep down inside for the entire volume of the magnetic field's interaction.
The high variation speed of the CTU Mega 20 magnetic field and its intensity up to 2 Tesla permits the energization of even the deepest levels of tissue, and not only on the surface.

Physiological stimulation frequencies:

Smooth muscle: *up to 50 Hz*
Striated muscle: *up to 100 Hz*
Nervous tissue (slow-twitch fibers): *up to 1,000 Hz*
Nervous tissue (fast-twitch fibers): *up to 5,000 Hz*
Cellular action: *up to 7,500 Hz*
Membrane action: *up to 10,000 Hz*
Tendon tissue: *above 10,000 Hz*



Variations in the frequency and shape of the magnetic pulse permit action to be taken selectively in different areas to be treated and tissue to be energized by wavelengths corresponding to the phisiological level.

CTU MEGA 20

DIAMAGNETIC PUMP

Diamagnetic therapy *stimulates biological tissue thanks to the effects of the electric field induced inside the cell membranes and endo-cytoplasmic structures that are charged with electric potential as a result.*

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CTU MEGA 20

DIAMAGNETIC PUMP

Unlike other electric *current methods, diamagnetic therapy, which uses the magnetic field, does not cause tissue polarization or the hydrolysis of pharmacological substances.*

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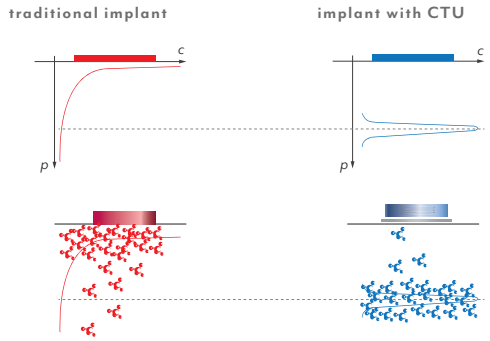
Molecular implant

With the CTU Mega 20, drug molecules can be trans-cutaneously administered using the repulsive mechanical force imparted by the magnetic field. The diamagnetic molecular implant follows a linear curve with Gaussian distribution at any given depth. The desired layering of the active principle can be obtained on the basis of the volume of the pharmaceutical product and the depth of implant. With conveyance by means of electrical current instead, substances are unevenly distributed throughout the tissues and subject to saturation because diffusion occurs exponentially.

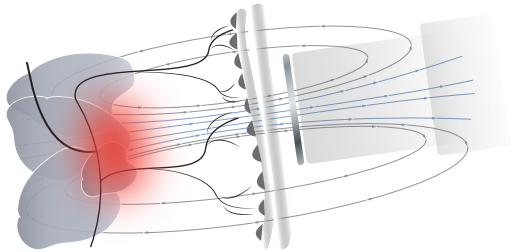
c: *concentration of active principle*

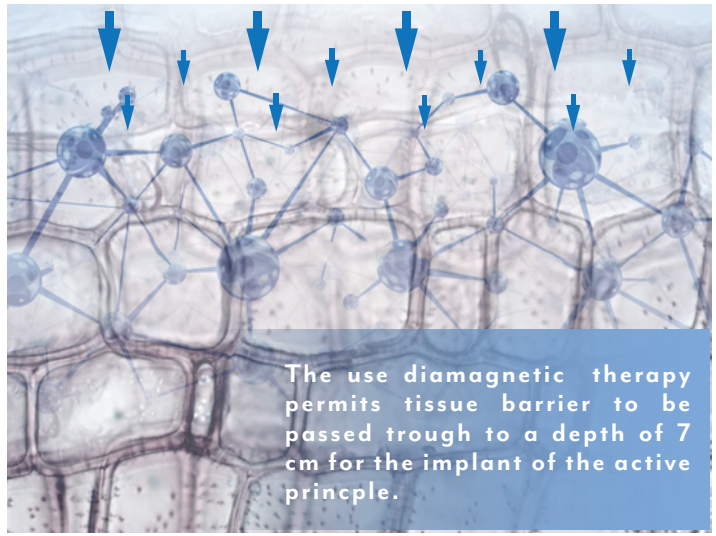
p: *depth of penetretion of tissue*



Pain control

A 215 KHz frequency induced in tissues by diamagnetic therapy permits selective action also on pain nerve receptors and trigger points using the pain control function either as a single treatment or as part of a multiple treatment regimen.

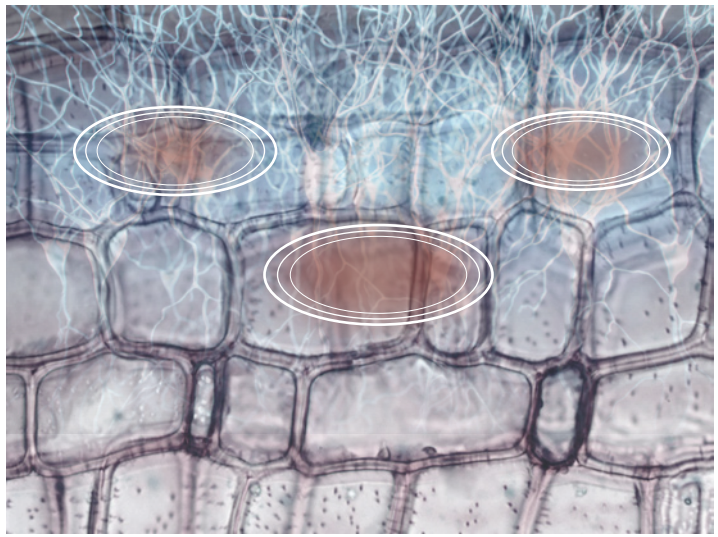




YES, OF COURSE, BUT...

Which pharmaceuticals can be administered by molecular implant?

All pharmaceuticals with diamagnetic properties or those that can be dissolved in the water used as an excipient can be given. All substances in watery solutions can be directly used by the system.



Magnetic Field + Radiofrequency

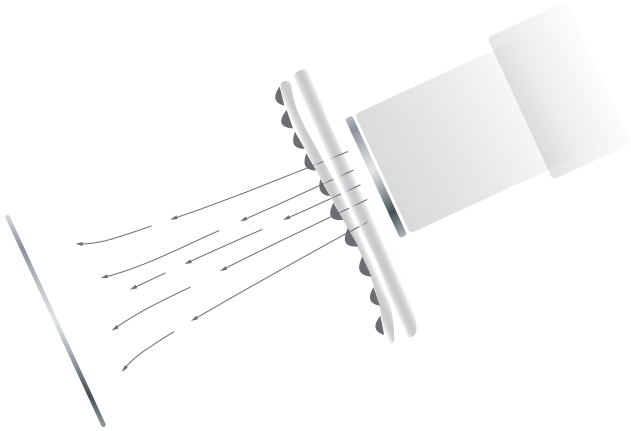
The CTU Mega 20 diamagnetic pump is designed to permit the use also of an electric generator that generates a radiofrequency that can be used in capacitive or resistive mode.

Capacitive

It releases more energy into the first layer, just beneath the electrode.

Resistive

It releases more energy into the biological tissue with high impedence.



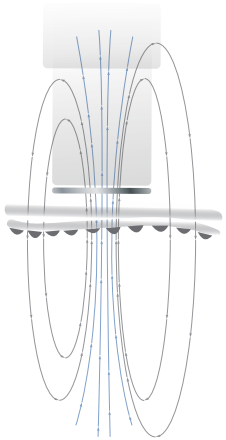
CTU MEGA 20

DIAMAGNETIC PUMP

The magnetic field *generated by the CTU Mega 20 can be used autonomously, whereas radiofrequency can be used only when accompanied by the magnetic field.*

Push and pull effect

Magnetic generator



Magnetic field

2 tesla

Electric generator

Electric field

Traditional radiofrequency

Therefore, with the CTU Mega 20 diamagnetic pump, the magnetic field can also be associated with diathermy for a special technique based on the so-called “push and pull” effect, a synergic combination of diamagnetic therapy and diathermy.

Push and pull effect

Under normal operating conditions, the increased arterial and venous blood flows induced by the diathermic process undergo saturation due to vasodilatation when the physical limitation imposed by the mechanical confinement of the external compartment is reached.

This limitation can be overcome thanks to the repulsive force generated by the magnetic field, which induces the drainage of the liquids from the area in question.

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CTU MEGA 20

DIAMAGNETIC PUMP

The CTU Mega 20 *generates a 470 kHz radiofrequency. Technological innovation permit the optimum use of diathermy for every type of treatment.*

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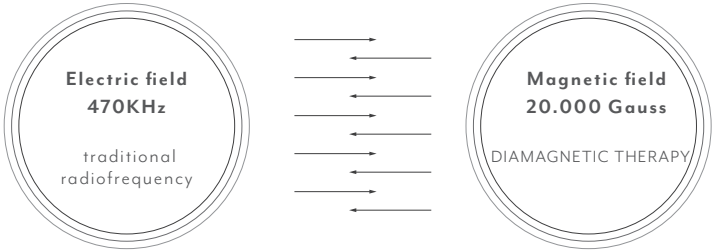
Synergic Interaction

Push and pull effect

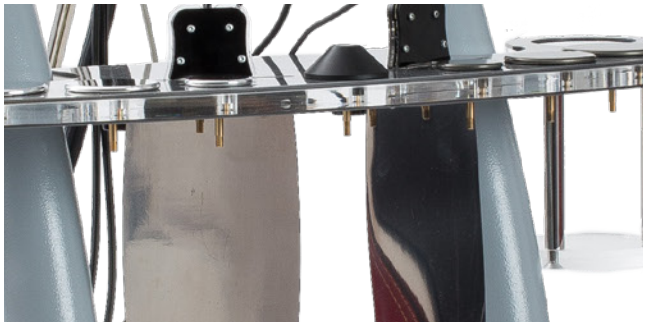


YES, OF COURSE, BUT...

What are the differences with traditional diathermy?

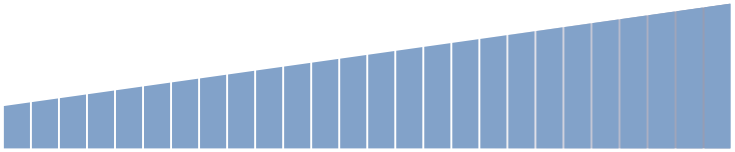
Traditional diathermy does NOT involve the use of a magnetic field generator, but only a normal electric generator whose therapeutic function is based exclusively on radiofrequency. It is the combined use of an electric generator and a magnetic field generator that enables therapeutic treatment that associates normal diathermy action with diamagnetic therapy action, in this way generating the "push and pull" effect.

TECHNOLOGICAL INNOVATION



DOUBLE NEUTRAL PLATE

The use of the double neutral permits the treatment of extensive areas of the body while maintaining the balance and uniformity of the energy administered, with the advantage of reducing treatment times and accelerating therapeutic effects.



IMPEDANCE METER

In every treatment with diathermy, the device autonomously enables a system for the monitoring of variations of electric impedance in tissues which are generally linked to local metabolic conditions. By recording these variations in electrical impedance, the system provides real-time information on tissue response to treatment.

Diamagnetic therapy

Fields of application

Orthopedics and traumatology: muscle and tendon lesions, degenerative pathologies of the bone and joint system, fractures and pseudoarthrosis, vascular bone pathologies.

Rheumatology: in rheumatic and inflammatory conditions.

Physiatrics: as a supplement to rehabilitative therapy and prevention treatments for muscular-skeletal system pathologies and neurologic disorders.

Sports medicine: osteitis pubis, tendonitis, contractures and muscle tears, sprains and contusions.

Phlebology and angiology: lymphatic, inflammatory and post-traumatic edema.

Dermatology and aesthetic medicine: in exposed skin lesions (sores and ulcers) for faster tissue regeneration.

Pain medicine

Aesthetic medicine

CTU MEGA 20

DIAMAGNETIC PUMP

When set with the right *parameters, the four mechanisms of CTU Mega 20 action permit the treatment of various pathologies in their various phases of evolution.*

Cervical pain

Popliteal tendonitis

Achilles tendinopathy

Patellar tendinopathy

MRI COMPARED

Patient: A.T.;

Gender: female;

Age: 37 years ;

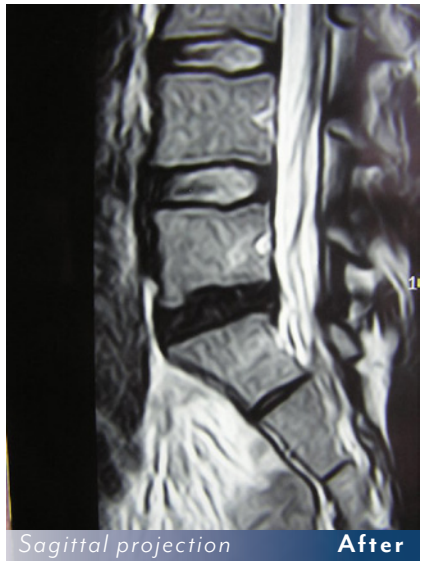
Profession: nurse;

Diagnosy: severe herniated discs, with inability to perform any work;

Medical prescription: surgery intervention;

*"**After the twenty-third treatment** with the diamagnetic pump, the patient no longer presented any symptoms of herniated disk. After the twenty-fifth treatment, the patient resumed his previous activities without any problem." dr. P. Laudikos*

Sagittal projection **Before**



Sagittal projection **After**

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Completion technology:

CTU S wave
DIAMAGNETIC **SHOCK WAVE**

CTU V wave
VIBRATION TRAINING

ATR med
DIATERMIA AUTOADATTATIVA

Enhancing your therapeutic process

CTU S WAVE

DIAMAGNETIC SHOCK WAVE

The shock wave *is produced by an interaction between the electromagnetic coil field flow and an acoustic lens composed of a highly diamagnetic alloy.*

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Classic shock wave generators produce only one wave shaper and for such reason do not permit the adaptation or modulation of space gradients as required by the pathology, depth of treatment, and anatomical area.

The **CTU S Wave** diamagnetic generator permits intervention on wave spatial gradients through the use of special acoustic lenses whose wave focus capacity recalls the Fresnel lens principle.

THE FIRST SHOCK WAVE WITH A DIAMAGNETIC GENERATOR

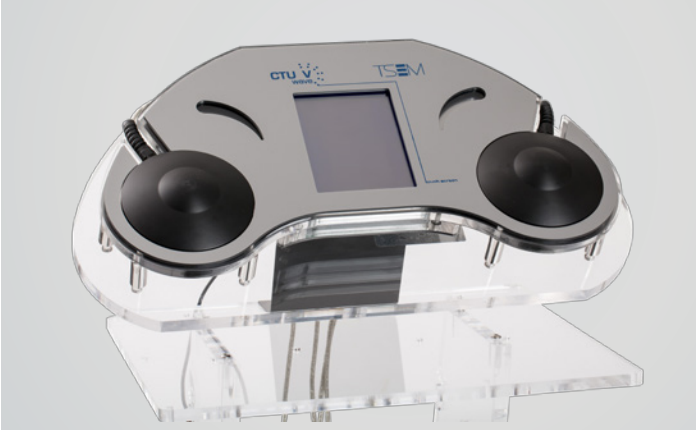
CTU S Wave combines the effects of the energy component induced by the pressure field linked to the shock wave with diamagnetic repulsion effects, associating biostimulation action with a drainage effect that permits an acceleration of treatment times for optimized recovery times.

CTU S Wave permits the simultaneous adjustment of both energy flow density and shock wave rise time modifying the space-time profile of the impulses emitted on the basis of the anatomic-pathological lesion in question and the tissue's characteristic of acoustic impedance.

MECHANICAL VIBRATION THERAPY
Controlled vibration induces involuntary muscle contractions and de-contractions with the relative neurological response.

CTU V Wave is equipped with a built-in electro-myograph reader that measures the echo produced by the spinal reflex arc.

EMG BIO-FEEDBACK IDENTIFY THE BEST THERAPEUTIC FREQUENCY



On the basis of the muscle response checked by the EMG system and the treatment objectives established, the **CTU V Wave** device modulates and adapts vibration frequencies in order to produce a randomized acoustic spectrum that annuls the effect of muscle inurement.

By monitoring muscle response, the **CTU V Wave** permits a real-time check on the acoustic impedance of the coupling between tissue and generator, and consequently the modulation of the energy reflected by the stationary waves, in this way optimizing vibratory action.

CTU V WAVE
VIBRATION TRAINING

The primary effects *of the CTU V Wave regard the muscle strengthening, trophism, and recovery. The device can also be used to prevent reductions in muscle mass associated with aging.*

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ATR MED

SELF-ADAPTING DIATHERMY

ATR Med, *the only device equipped with a system that permits the monitoring of the energy transfer efficiency, also provides a system for the self-control of the energy administered during the various phases of treatment.*

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ATR Med radiofrequency technology stimulates tissue from the inside and at deep level, while allowing pain control through intense and immediate anti-inflammatory action and accelerating functional recovery by reactivating natural tissue repair mechanisms.

With **ATR Med**, tissue impedance variations are monitored and shown on screen in real time. This offers the possibility to compare tissue impedance with the variations in progress during treatment, which can therefore be modulated as required.

INNOVATIVE INTERACTION BETWEEN RADIOFREQUENCY AND BIOLOGICAL TISSUE

ATR Med offers the possibility to utilize more than one frequency that can be selected to act with greater selectivity on the targets identified

NRV: 215 KHz pain therapy
PLUS: 430 KHz deep tissue treatment
EVOLUTION: 645 KHz surface tissue treatment

ATR Med can deliver the energy most suited to variations in tissue impedance, the pre-selected parameters or the treatment mode required (capacitive or resistive). The device comes with aluminum electrodes (resistive) and corundum electrodes (capacitive).

Since always
we design technology
aimed to effectively support
the doctor-patient relationship.

Excellence which innovates.

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