



Δeltathermia

To cool in order to heat, two power-sources for one programmed and repeatable heat dose

Δeltathermia constitutes the true new development in the field of the endogenous thermotherapy. The term **Δeltathermia** has been associated closely and rigorously to the concepts of the great effectiveness of heating in depth and the great accuracy in the control of the distribution of temperature in tissues. The winning technical innovation, derived from ten years of direct experience, has been the choice to bind together two sources that operate simultaneously on the treatment area: one endogenous and one exogenous. This solution represents the heart of the innovation and is what brought to overcome the technological and therapeutic limits of traditional thermotherapy.

The endogenous heating, through the use of electromagnetic field generators, is now consolidated; on the contrary the combination with an exogenous cooling source (thermostated water bolus) identifies the new methodology called **Δeltathermia** in an original and unequivocal manner.

The new Δelta equipment

The new **Δelta** equipment constitute the technological presupposition of **Δeltathermia**.

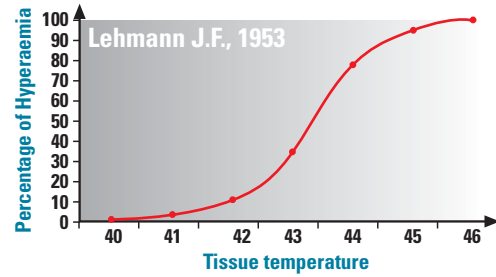
It guarantees simultaneous local application of endogenous heat of high penetration (obtained with electromagnetic waves at the frequency of 433.92 MHz) and exogenous heat with high stabilizing capability in surface (obtained with a thermostated liquid that flows in a special bag which is put in contact with the zone to treat). The electromagnetic energy emission control is carried out on the base of the temperature measured in the interface between the skin and the cooling bag, tied in its turn to the temperature of the deeper tissues through algorithms and models experimented in oncology.

The measurement of the temperature avails itself of an original solution: the differential measuring system **Δeltatherm®** that allows to control the temperatures of treatment with the highest level of precision indispensable for the attainment of the therapeutic result.

CE 0434

Controlled and selective heating

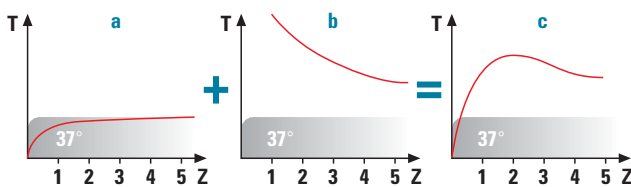
In all the studies on the therapeutic effects of heat, hyperaemia induced by the raising of localized temperature has been found to be the most important factor. Lehmann has quantified the amount of hyperaemia in function of a local raise of temperature, evidencing the importance of working between 41° and 45°C. The margin of effectiveness and safety is therefore very tight: a system that not only heats, but also accurately controls the heat is hence necessary. In order to control the heating it is necessary to know the distribution of temperature in the treated volume, and therefore measure a large amount of points, or at least a meaningful point provided that an experimented physical-mathematical model is available to estimate the levels reached where it is not possible to carry out direct measures.



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Heat directly transferred into tissues from the outside through conduction and convection (exogenous source) does not have penetrating abilities, therefore in order to go into depth it is necessary to resort to an endogenous source, that is, a suitable form of energy to reach into the tissues and then transform into heat.

Feasibility and compatibility criteria with the European regulations together with the result of a long experience have induced to choose an electromagnetic wave of 433,92 MHz.

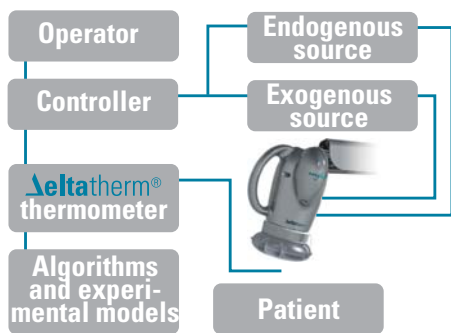


Sum of the effects of one exogenous cooling source (a) and an endogenous heating one (b). As can be seen in (c), the exogenous source lowers the temperature in proximity of the surface, where it has a highly stabilizing capability; therefore, at the same skin temperature, the endogenous source can be brought to operate at greater power than in the absence of a cooling system. **Therefore the heat can be brought more in depth and the resulting curve is smoothed and much predictable than with a single source.**

The wave propagates from the skin surface towards the inside, and while it proceeds it is adsorbed, losing electromagnetic energy that is transformed into heat. Because of the roughly stratified structure of the muscle-skeletal apparatus (skin, fat, muscle, bone) and of the way in which the electric field is oriented (mostly parallel to the layers), it happens that a greater amount of energy comes deposited in the tissues that are mainly perfused by blood and consequently more able to cool down increasing perfusion. However the wave that crosses the more superficial layers is loaded with energy and tends to deposit it in large amounts; the raising of temperature in the superficial zone will therefore be greater than the increments of the inner zones. This non-homogeneity can be maintained within acceptable limits adding an exogenous source with high stabilizing capability, that can remove the heat in excess on the surface putting it in contact with a controlled temperature circulating liquid. Since this thermal exchange only happens at a modest depth (approximately 1cm) the result is a leveling of the temperatures, with a localizable maximum between 2 and 4 cm under the surface and therapeutic levels of temperature up to 6-7 cm of depth.

The possibility to control the depth of the area of maximum heating by regulating the temperature of the cooling liquid and the electromagnetic power of the energy allows to produce and to program the correct dose of heat for the pathology and the patient.





Heating at the wanted depth up to the desired temperature without superficial overheating

A system for **DeltaThermia** is characterized by the following elements:

- One source of endogenous heat constituted by a generator of electromagnetic waves at a frequency of 433,92 MHz.
- One source of exogenous thermo-regulation for the cooling of the cutaneous layers
- A transmitter able to transfer both types of energies, endogenous by electromagnetic means and exogenous one for thermal conduction/convection; the transmission of energy through water happens in ideal conditions of electromagnetic and mechanic coupling.
- A highly precise thermometric system for controlling both sources.
- An intelligent controller that manage the session parameters, in particular the power of electromagnetic emission according to thermometric measurements.
- A live tested control algorithm.

Heat to heal, an important role in the rehabilitation program

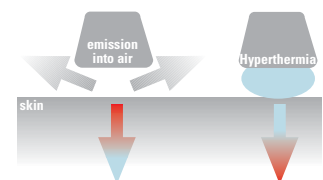
DeltaThermia has become the chosen treatment for some important physiotherapeutic pathologies of the muscle-tendon apparatus, and plays a fundamental role integrating with other methodologies in the more general rehabilitating program. In particular **DeltaThermia** is used in the following situations:

- **Reduction of the inflammation and the painful symptomatology derived from a trauma.**
After the acute phase, **DeltaThermia** used with caution begins to help in sub-acute phase and turns out optimal in the synthetic and remodeling phase.
- **Treatment of chronic degeneration.**
The possibility of **DeltaThermia** to apply heat in a controlled way allows to execute effective and well dosed treatments on a particularly fragile and defenseless area, with wide documented results on the painful symptomatology and therefore, on the recovery of the movement and the activity of the subject.
- **Recovery of the extension of movement.**
The association of **DeltaThermia** and aimed mechanical stretching, facilitate the non-traumatic flowing of collagen fibers therefore increasing the range of movement; for example in articular rigidity, with successive relief of the painful symptomatology.
- **Specific Indications.**
In particular **DeltaThermia** finds indications in the following pathologies:

Muscle Pathologies	Tendon Pathologies	Osteocartilagineous Pathologies	Bursal Pathologies	Neural Pathologies
Contractures	Tendinitis and	Knee's arthritis	Baker's cystis	Plantar neuroma
Contusions	Peritendinitis of:	Lumbar spine arthritis	SAD	Carpal tunnel sindrome
Elongations	Achilles	Cervical spine arthritis	Oleocranis	Tarsal tunnel sindrome
I° and II° degree lesions	Patellar	Trapeziometacarpal arthritis	Patellar	
Ossifying Myositis	Rotator cuff	Coxofemoral arthritis		
	Biceps	Fracture's sequels		
	Tendinosis	Stress fractures		
	De Quervain disease	Adhesive capsulatis		
	Dupuytren disease			
	Epicondilitis			
	Epitrocleitis			
	Groin strains			
	Plantar fascitis			

Safety of the patient and of the operator

The sophisticated measuring and control system that characterize our **DeltaThermia** equipment keeps watch of the treatment and guarantees the execution of safe sessions for the patient and the total respect of the treatment parameters entered by the operator. The emission and the transfer of electromagnetic energy through water guarantee an optimal coupling of source and tissue thus reducing dispersion in the environment and risks of exposure by the staff to a minimum.



Effectiveness and efficiency, more time for the patients

The few necessary commands, the reference protocols and the sophisticated control system do not bind the operator to the machine therefore allowing more time for the patients.

The experience of the operator becomes rewarded; through simple operations on the standard parameters it is possible to set up a personalized session for the patient and the pathology in order to obtain a better result in lesser time.

Results at the Highest Levels

Besides the hundreds of University Institutes, Hospitals, Physiotherapy and Rehabilitation Centers, **easytech** solutions are also being used by: Federazione Italiana Giuoco Calcio, Federazione Italiana Atletica Leggera, Brescia Calcio, Fiorentina A.C., Lazio S.S., Milan A.C., Parma A.C., Roma A.S., Chelsea F.C., Panathinaikos F.C.

Main characteristics

- Microprocessor controlled; membrane operator keyboard and display integrated in a movable console
- Preprogrammed treatment protocols
- Self balancing applicator arm
- Possibility of connection to a computerized work-station

Applicator

- Ridged Conical Horn type applicator
- Bandwidth 60MHz
- Radiating aperture diameter 100mm
- Patient coupling by means of a water bolus

Bolus

- Variable volume bolus containing thermostated water
- Resistant material of high thermal conductivity

Electromagnetic Source

- Power of emission: up to 100W
- Working frequency: 433,92 MHz
- Wave generated directly in the thermostated water
- Graphical and acoustic signaling of bad electromagnetic patient coupling
- Continuous automatic regulation of the emitted power

Cutaneous cooling system

- Superficial tissue cooling system through thermostated liquid with forced circulation integrated in the applicator
- Range of temperature of the cooling liquid between 35°C - 41.5°C
- Automatic volume variation of the cooling bag.

Cutaneous temperature control system

- Copper-Constantan Thermocouple sensor
- **Δelta**therm® differential measurement system for a maximum precision of the treatment temperature. Maximum error: 0.2°C
- Range of programmable skin temperature: between 38°C and 42°C.

Treatment

- Treatment temperature: between 39°C and 44,5°C
- Depth of thermal effect: up to 7 cm

Operating configuration

- Entry-level
- New Advanced System option (entry-level + computerized workstation)

Regulations

- CE 0434 - Certificate of conformity
DNV n° 98-osl-sd-0124

Power requirements

- Supply voltage and frequency: 220V. 50/60Hz
- Maximum current: 6A

Sizes and weights

- Height (arm resting): 1180 millimeters
- Width (arm resting): 500 millimeters
- Depth: 700 millimeters
- Weight: 75 Kg

Δeltathermia
high precision hyperthermia

The constructor reserves the right to bring modifications without warning

design by Paoletti Studio



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