

Clinic

The CRET therapy:
From evidence-based practice to new treatment modalities

DEFINITION

Capacitive and Resistive Diathermy
"DiaCaRe" is a technology that delivers a non-invasive therapeutic sinusoidal current applied to the human body through mobile or fixed electrodes

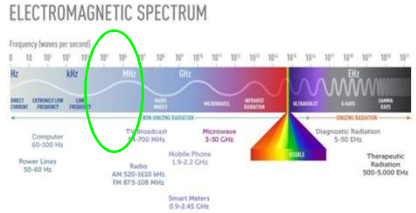


CRET CLINIC

DEFINITION

FREQUENCY RANGE : 400-1200 Hz

ELECTROMAGNETIC SPECTRUM




CRET CLINIC

DEFINITION

Capacitor principle: 2 facing elements (capacitor plates), separated by an insulating material, connected to an electric generator that creates a potential difference between the two electrodes.

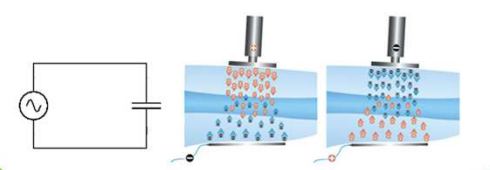
The voltage generator operates to 0,470 MHz frequency: in this setting there's no external energy emission, but there is only endogenous energy production at biological tissue level, produced by the alternating movement of attraction and repulsion (470,000 times per second) of electric charges that, in the form of electrolytes, are the essential constituents of each biological substrate (and therefore the human body). The application is for contact.

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DEFINITION

This range of frequencies promotes the movement of ions and molecules in the entire tissue, accelerating intra and extra cellular exchanges, promoting and accelerating the healing and regenerative tissues' processes

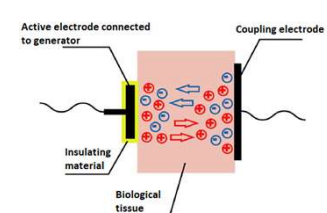


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DEFINITION

Ionic flux movement (positive and negative)




Active electrode connected to generator

Coupling electrode

Insulating material

Biological tissue

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DEFINITION

GLOBUS ACADEMY

- Polar molecules
- Bipolar
- Non polar

CRET CLINIC

DEFINITION

GLOBUS ACADEMY

Temporary cell deformation, due to high frequencies deployment with energy lower than molecular bond

M. Del Maschio, M. Khanatek, FM Pigot, A. Capullo, G. Pizzotto, Carlo Riegleri Biophysical effects of high frequency electrical field (4-64 MHz) on muscle fibers in culture, Basic Applied Myology 18 (8) 2008

DEFINITION: RESISTIVE

GLOBUS ACADEMY

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DEFINITION: CAPACITIVE

The diagram shows a cross-section of biological tissues. At the top is the 'TESUTO DORSO' (back tissue), followed by a layer of 'TESSUTO MOLLE' (soft tissue). Below that is another layer of 'TESUTO DORSO'. A red oval highlights a region in the middle soft tissue layer where yellow stars with plus signs are concentrated, indicating the focus of the capacitive treatment. A grey electrode is shown on the surface above the oval, and another is shown below the bottom layer of back tissue. Arrows indicate the direction of the electric field.

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DEFINITION

Two specific ways:

- CAPACITIVE (with insulated electrodes) for focusing the treatment near the electrode
- RESISTIVE (with conductive electrodes) for focusing treatment in depth

The left diagram shows a shoulder with a red dot on the surface, representing capacitive treatment. The right diagram shows a shoulder with a red dot deeper in the tissue, representing resistive treatment.

CRET CLINIC

FEATURES

Effects of DiaCaRe on biological tissues:
Extensibility increase in soft tissues and muscle relaxation

The diagram shows a DiaCaRe device on the left. To its right, a green arrow points up to the word 'TEMPERATURE'. Further right, three green arrows point down to 'NEURO-MOTOR ACTIVITY', 'CONNECTIVE VISCOSITY', and 'COLLAGEN EXTENSIBILITY'. A green arrow points up to 'COLLAGEN EXTENSIBILITY'.

CRET medium-high power

Effect of Capacitive and Resistive electric transfer on changes in muscle flexibility and alignment lumbopelvic after fatiguing exercise.
Yokota Y, Senoike T, et al. M. J Phys Ther Sci. 2019 May

FEATURES

Effects of DiaCaRe on biological tissues:
ANGIOGENESIS PROMOTION

PULSED SHORTWAVE THERAPY BLOOD FLOW

CRET LOW ENERGY (Eg Pulsed) BLOOD FLOW VOLUME

CRET HIGH ENERGY BLOOD FLOW VOLUME
BLOOD FLOW SPEED

Kumar, B. A., Hartland and T. Watson (2017), "Continuous-mode 448 kHz resistive monopolar capacitive radiofrequency induces deep greater blood flow changes Compared to shortwave pulsed mode: a crossover study in healthy adults." European Journal of Physiotherapy 19 (3): 137-146

FEATURES

Effects of DiaCaRe on biological tissues:
DECREASE IN PAIN MODULATION (non-thermal)

PAIN GENE EXPRESSION

CRET HIGH ENERGY

Pulsed radiofrequency modulates pain regulatory gene expression along the nociceptive pathway. Vallejo R, Tilley DM, Williams J, Labak S, L. Alagia, Benaymin RM. Pain Physician. 2013 Sep-Oct; 16 (5): E601-13.

FEATURES

Effects of DiaCaRe on biological tissues:
INCREASED HAEMOGLOBIN SATURATION


IMPACCO PACK HbO2

CRET HbO2


Effect of Capacitive and Resistive electric transfer on haemoglobin saturation and tissue temperature. Tashiro Y, Hisagawa S, Yokota Y, Nishiguchi S. Int J Hyperthermia. 2017 Sep;33(5):696-702. doi: 10.1080/02656736.2017.1289252. Epub 2017 Feb 19.

FEATURES

The effects of DiaCaRe on biological tissues:
INCREASED COLLAGEN SYNTHESIS (subthermal):



Sub-thermal CRET  chondrogenic Differentiation

Hernández-Baib ML, Tello MA, Martínez-García MA, Abalricout C, Ubeda A (2017) Chondrogenic Differentiation of Adipose-Derived Stem Cells by Radiofrequency Electric Stimulation. J Stem Cell Res Ther 7: 407. doi: 10.4172/2157-7633.1000407




FEATURES

Effects of DiaCaRe on biological tissues:
MESENCHYMAL CELLS PROLIFERATION

  **CHONDROCYTES AND OSTEOCYTES CELLULAR SYNTHESIS PROMOTION**


LOW ENERGY CRET

Electric stimulation at 448 kHz promotes proliferation of human mesenchymal stem cells. Hernández-Baib ML, Peiró CL, Tello MA, Ubeda A. Cell Physiol Biochem. 2014;34(5):1741-55. doi: 10.1159/000363375. Epub 2014 Nov 12




FEATURES

The effects of DiaCaRe on biological tissues:
ADIPOGENESIS DECREASE

HIGH ENERGY CRET (42°C)  Adipogenic differentiation

Repressive effects of a capacitive-resistive electric transfer (CRET) hyperthermic apparatus combined with pravastatin C on intracellular lipid-droplets formation in adipocytes. Kato S, Sakoh Y, Miwa N, Irie J. Hyperthermia. 2013;2(1):30-7. doi: 10.31003/0256736.2012.750016. Epub 2013 Jan 3.
Antidiabetic effects of subthermal electric stimulation at 440 kHz on differentiating human mesenchymal stem cells. Hernández-Baib ML, Martínez-García J, Tello MA, Peiró CL, Ubeda A. Mol Med Rep. 2016 May;13(5):3895-903. doi: 10.3892/mmr.2016.5332. Epub 2016 Mar 21.




FEATURES

SCIENTIFIC EVIDENCE: REVIEW

In summary, only a limited number of clinical studies have been published in the non-shortwave RF category. They suggest that RF energy below the frequency of 10 MHz might deliver appreciable therapeutic effects.(..)This warrants particular emphasis in this area especially since EPAs delivering non-shortwave RF are already in clinical use and that the studies published so far have reported encouraging results.

Shroy Kumarin & Tim Watson (2016): Radiofrequency-based therapy in treatment-related clinical practice - a narrative review. Part II: chronic conditions. Physical Therapy Reviews




FEATURES

This results in:

1. **PAIN REDUCTION**
2. **MUSCULAR CONTRACTURES REDUCTION**
3. **JOINT STIFFNESS REDUCTION**
4. **HEMATOMA and OEDEMAS REABSORPTION**
5. **TISSUE REGENERATION ACCELERATION**

CRET CLINIC




PGE METHOD


POWER

GEOMETRY


Electrode




CRET CLINIC




POWER




- 62 ° C - irreversible protein denaturation
- 45 ° C - beginning of pain perception
- 40 ° C - beginning of heating perception
- 30-41 ° C - THERAPEUTIC WINDOW






POWER



- + 1 ° C inflammation decrease
- + 2-3 ° C muscle contracture reduction
- + 3-4 ° C tissue extensibility increase


Leitman J, Delator B. Therapeutic heat. In: Leitman J, editor. Therapeutic Heat and Cold, 4th ed. Baltimore: Williams & Wilkins, 1996: pp470-4. Practice W, Chapter D. Shortwave diathermy and microwave. In: Practice W, editor. Therapeutic Modalities in Rehabilitation, 4th ed. New York: McGraw-Hill; 2011. p. 432-42

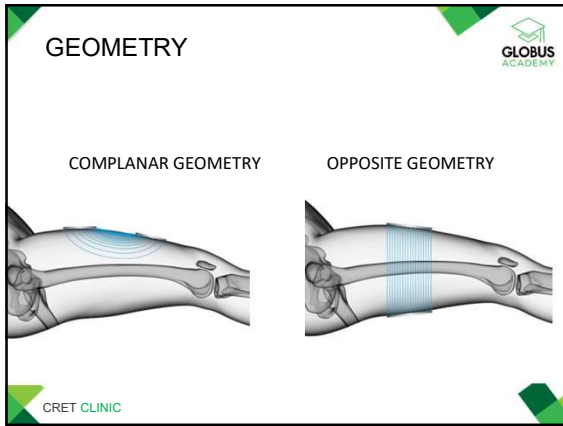
POWER

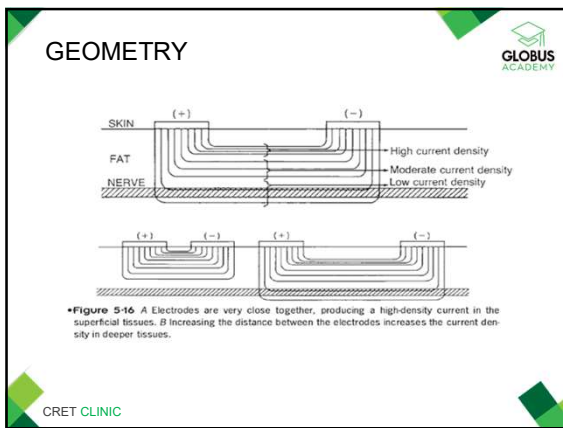


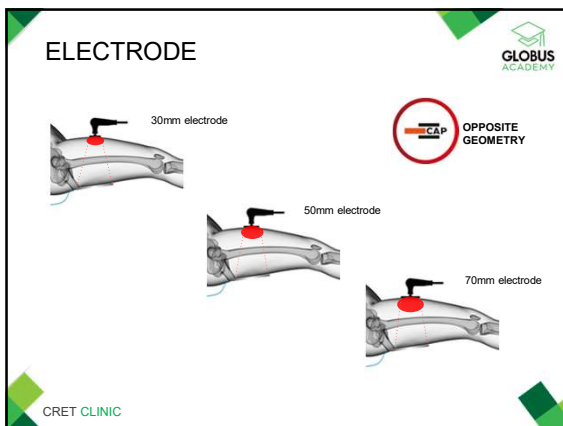
30-41 ° C - THERAPEUTIC WINDOW

- 41-38 ° C – High Thermal effects
Deep muscle relaxation, excellent in muscle tension, contractures, stiffness and fibrosis treatment
- 38-35 ° C - moderately Thermal effects
Oxygenation, vascularization, drainage and tissue regeneration. The stimulation of fibroblasts induces the production of elastin, collagen, extracellular matrix and the stimulation of cell growth
- 30-35 ° C - Effects without heat production
Pain killer, anti-inflammatory, bio stimulant effects; it can also be used in the acute phase









ELECTRODE

30mm electrode

50mm electrode

70mm electrode

WAVES OPPOSITE GEOMETRY

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FREQUENCY

No demodulation mechanism has been reported for frequencies above approximately 10 MHz.

Therefore, the RF fields above 10 MHz are not adjusted by biological systems so efficient enough to influence the endogenous fields, in particular by mechanisms involving changes in electric potentials of the plasma membrane.

Resonances in most molecules occur between 0.1 to 10 MHz

Quantitative evaluations of mechanisms of radiofrequency interactions with biological molecules and processes. Sheppard AR, Swicord ML, Q. Balzano Health Phys. 2008 Oct; 95 (4): 385-96.

GLOBUS ACADEMY

FREQUENCY

By studying the behaviour of biological tissues at different frequencies, the following phenomena was observed:

- 1. dispersion α :** cellular level(charge of membrane-bounded intracellular organelles and a frequency dependent impedance in of cell membrane) 100Hz
- 2. dispersion β :** Polarization of proteins. 1MHz
- 3. dispersion γ :** Water polarization 10 GHz

Bioengineering and Biophysical Aspects of Electromagnetic Fields. Handbook of Biological Effects of Electromagnetic Fields. Ben Greenbaum, Frank S. Barnes, CRC Press, 2006

GLOBUS ACADEMY

USER GUIDE

Instant Power: 650mA

Absorbed Energy: 44%

Power Supplied: [Green Bar]

Tissue Impedance: 130 Ω

55w, 49,5 KJ

Time: 20'

Mode: RES

F: 470 Hz

Electrode: MONO

Site: UNIVERSAL

REMAINING TIME: 5'

User: DU

Ph 1, Ph 2

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USER GUIDE

POWER SUPPLIED: it depends on our goal

ABSORBED ENERGY: Power indicator transferred to patient

TISSUE IMPEDANCE: conductivity index

INSTANT CURRENT: type of stimulation indicator

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USER GUIDE


ATLAS

- navigation through diseases
- scientifically validated programs


CRET CLINIC

USER GUIDE





 athermic

- treatment without heat generation
- To be used in the acute phase to increase the pain killer effect without stimulating blood extravasation



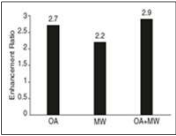
USER GUIDE



 conveying


It promotes the absorption of active therapeutic principles

"The electromagnetic waves impose their effects of improvement through the fluidization of the intercellular lipids of the stratum corneum"



Method	Enhancement Factor
OA	2.7
MW	2.2
OA+MW	2.9

Percutaneous Penetration Enhancers Physical Methods in Penetration Enhancement - Nina Dragovic, Howard J. Maibach Springer, 2017



USER GUIDE





 **HANDS FREE:** program that uses fixed adhesives electrodes allowing the therapist to perform manual therapy on patient or to perform exercises






USER GUIDE


 GLOBUS ACADEMY


 **SHORT GEOMETRY:** Electrodes positioned at a distance less than or equal to 20cm




TECAR CLINIC

USER GUIDE


 GLOBUS ACADEMY


 **MEDIUM GEOMETRY:**
Electrodes positioned between 20 and 50cm




TECAR CLINIC

USER GUIDE


 GLOBUS ACADEMY


 **LONG GEOMETRY:**
Electrodes positioned between 50 and 120cm

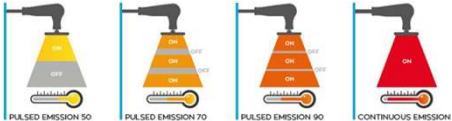



TECAR CLINIC

USER GUIDE





 **PULSED**
special program for production of high energy peaks, in order to supply energy in a short time with limited thermal effects.






USER GUIDE



 **SCAN**
Program with specific parameters used in order to sequentially stimulate tissues with different conductivity in the same treatment



THANK YOU.



