PULSED ELECTROMAGNETIC FIELDS "PEMF"
CTU – MEDICAL DEVICE *PERISO sa,*
for the
TREATMENT OF THE LYMPHOEDEMA

Abstract

Background:
Lymphoedema represents a chronic pathology, that renders patients physically and psychologically disabled, it is not easy to control, and shows a marked tendency to spontaneously set in complications, although the pathogenetic details are still an open question, the general principles of the disease's physiopathology are well known.

Study Objective:
the purpose of this study was to evaluate the efficacy of PEMF (Pulsed Electromagnetic Field, CTU Medical Device - Periso sa) for the treatment of patients with **LYMPHOEDEMA**

Methods:
in this randomized controlled study, a total of 38 patients, who presented 42 limbs affected by Lymphoedema were randomly split into two groups and subjected to an application of PEMF CTU – MEDICAL DEVICE – PERISO sa, plus compression or to a only compression treatment. Clinical and instrumental controls were performed to evaluate the healing status.

Results:
Clinical (limb's circumferences and consistency) and instrumental (soft tissues echography) controls showed a positive result in patients treated both by PEMF CTU Medical Device – PERISO sa, and compression with respect to those treated only by compression.

Conclusions:
The data we obtained confirm the validity of the therapeutic approach (CTU Medical Device – PERISO sa), even it is certainly integrable with all other therapeutic treatments of oedema, in general, and of lymphoedema, in particular**,**

Search strategy:
databases used to identify studies for this clinical study include Medline, Embase and Cochrane.

Keywords:
PEMF, RANGE OF MOTION (ROM), EDEMA, LYMPHEDEMA, LYMPHOEDEMA, PEMF. No language limit was applied.

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INTRODUCTION

Lymphoedema represents a chronic pathology, that renders patients physically and psychologically disabled, it is not easy to control, and shows a marked tendency to spontaneously set in complications. For such reasons lymphoedema demands for a novel early, targeted and lasting diagnostic and therapeutic approach. So far it is frequently claimed, in a completely misleading manner, that nor the lymphoedema physiopathology is clear or the corresponding treatment is satisfactory. Nevertheless, though the pathogenetic details are still an open question, the general principles of the disease's physiopathology are well known. On one side, the main disorder may be characterized by a "low output failure" of the lymphatic system, that is, a general decreasing of the lymphatic flow. Such a disorder can be due to a congenital lymphatic dysplasia (primary lymphoedema) or to an anatomic obliteration, for example caused by a radical surgical resection or by radiotherapy, or again as a consequence of repeated lymphangitis with lymphangiosclerosis or, finally, produced by a functional insufficiency such that due to lymphangiospasm, paralysis and valvular insufficiency (secondary lymphoedema). In any case, the common feature is a disorder in the lymphatic transport mechanism, that decrease below the minimum capability required by the microvascular filtrate, that includes plasmatic proteins and cells that normally come out from the haematic network entering the interstice. On the other side, the "high output failure" of lymphatic circulation occurs when an excess of capillary haematic filtrate overcomes the normal transport capability of the lymphatic system as for example happens in the liver cirrhosis (ascites), in the nephrosic syndrome (anasarca) and in the inferior limbs deep venous insufficiency (post-thrombophlebitic syndrome) and the severe phlebostasis. The lymphatic injury, both primitive and
secondary, worsen in time due to the creation of a vicious circle: LYMPHATIC DISORDER → INCREASE OF PROTEIN RICH INTERSTITIAL LIQUID → DECREASE OF PROTEOLYTIC CAPABILITY→ INCREASE OF INTERSTITIAL CONNECTIVE → FIBROSIS. In the subcutaneous tissue of patients affected by lymphoedema an increase of the amount of interstitial liquid, rich in proteins,is observed. To the increase a chronic phlogosis is associated (the monocyte-macrophage system and the fibroblast are activated), with a growth of the interstitial matrix. The lymph accumulates in the fascia, forming "holes" or "lymphatic lakes" and the three-dimensional retina culum structure addresses molecules and lymph toward the cutis surface. The hydrophobic adipose lobules keep the water component off, so that it accumulates along the retina culum. Finally, we observe an upsetting of the subcutaneous tissue, with the appearance of "comb" picture(4).

DEVICE DESCRIPTION

PULSED LOW-FREQUENCY ELECTROMAGNETIC FIELDS: The pulsed low-frequency (< 50Hz; ~7Hz) electromagnetic fields (1b) belong to the class of non ionizing radiations, that is, they are characterized by an associated energy below 12 eV (electron-Volt). Such an energy is insufficient both to turn on ionization phenomena in molecules and to break even very weak chemical bonds. For this reason in the last decades these radiations have not been considered able to interact with biological systems and, as a consequence, the studies on this subject were scarce and information poor, especially when compared with the great amount of knowledge concerning the interactions among ionizing radiations and biological systems (2b). Only recently, due to the more and more common use of electromagnetic fields of different intensity and frequencies (3b), a vast research activity (4b-5b-6b-7b-8b-9b-10b-11b) has started,

addresses to the definition of their main biological and therapeutic effects, on which are based the exposition thresholds currently recommended.

DIAMAGNETISM: The diamagnetism works on hydrogen atoms. Indeed, when a hydrogen atom is covalently bound to a strongly electronegative atom, as for example the oxygen, the bond electrons tend to move toward the latter. As a consequence, the H atom assumes a partial but consistent positive charge. This charge, distributed in a small volume, lead to a high electric charge density. At this point, the hydrogen atom tends to bind with a partially negatively charged atom (the oxygen atom of a different water molecule) in this way acquiring a greater stability neutralizing its electric charge.

A single water molecule does not feel any net force, since it is subject to the action of the surrounding molecules that are uniformly distributed in any direction of the three-dimensional space. The liquid water consists in a disordered network of molecules, bound together by relatively weak chemical bonds. Such a network is continuously subject to fluctuations that randomly break and create new bonds among the molecules. Due to these characteristics the water does not have a proper dipole magnetic moment and it is repelled by an external magnetic field (diamagnetism). The PEMF - CTU PERISO sa (Fig. 1), is a device of molecular diamagnetic acceleration. It uses an energy of up to 200 Joule, generating high power (2 Tesla), pulsating fields and developing a water-repulsive force with the following main therapeutic aims:

- liquids transport;
- tissue biostimulation.

Liquids transport: as a result of diamagnetic repulsion, the free water in the extracellular compartments is fiercely pushed away from the field application site. The transport of extracellular liquids helps the oedema and post-traumatic effusions reabsorption and the scoriae removal, and stimulate the lymphatic circulation and related phenomena also thanks to the vasodilatation draining action produced by the diathermia coupled with PEMF (CTU – PERISO sa). In addition, the magnetic field works on the intracellular liquids, increasing their mobility. The increase of the thermal molecular excitation supports the cells biochemical activity as well as the mitochondrial and phagic-lysosomal metabolic mechanisms. The result is a beneficial acceleration of all energetic, metabolic and cellular activities like ionic transport, scoriae removal and cellular breathing.

Tissue biostimulation: a variable magnetic field crossing a conductor induces an electric current. The human body is a conductor, that when it is crossed by a magnetic field the phenomenon of biostimulation occurs. The action of magnetic fields is well described in terms of bioelectric parallelisms existing among cells (12b), since it acts on the difference of electric potential on the membrane sides as well as on the orientation af the circulating atoms that behave as elementary magnetic dipoles (13b, 14b).

Fig. 1

SEARCH STRATEGY

Medline, Embase, and the Cochrane Central Register of Controlled Trials (CENTRAL) were searched from the inception of each database from May 2013 to May 2014. The Medline and Embase databases were searched together via www.embase. com. The search was conducted using the keywords lymphoedema, limbs lymphoedema, lymphatic disorder, chronic pathology, lymphangio PEMF, and it was limited to RCTs (List 1). Additionally, all of the available reviews related to lhymphoedema were manually screened for any additional possibly relevant studies. No language limit was applied.

List 1 Search Strategy used in www.embase.com (step by step):

((lymphoedema[ti] OR lymphedema[ti] OR Lymphedema[majr]) AND (systematic[ti] OR systematic[sb])) OR ((lymphoedema[ti] OR lymphedema[ti] OR Lymphedema[majr]) AND (Therapy/Broad[filter])) OR ((lymphoedema OR lymphedema) AND (decongestive OR CDT OR compression OR bandag* OR infection[ti] OR BMI OR weight[ti] OR drainage OR "skin care" OR exercise OR prophylactic* OR garment* OR hyperbaric OR laser OR pneumatic OR dressing OR pump OR diuretic* OR

MATERIALS AND METHODS

In the framework of the Vascular Surgery Operative Unit – University of Ferrara and of the "Oedema Centre" in Nola (NA) we evaluated 42 limbs affected by lymphoedema in 38 patients aged from 21 to 67 (average 47 ys). 34 patients were affected by monolateral lymphoedema (30 in the inferior, 4 in the superior limb) and 4 by bilateral lymphoedema, with oedema localized at inferior limbs. We built up two randomized groups. Patients in group 1 were treated with PEMF CTU Medical Device Periso sa, together with 2nd class compression stockings; patients in group 2 were treated only with 2nd class compression stockings.

Every patients were asked to fill an Inform and Consent form and submitted to an accurate case history interview using a clinical file devoted to CEAP-L Classification (23) that

permitted us, at the end of the study, to get objective clinical conclusions.
All patients were then selected by C CEAP-L class (C stage of disease (1-5), localization and involvement grading) (Tables 3, 4, 5).

Table 3 - Clinical classification

C1	No edema (preclinical stage)	1 point
C2	Edema that disappears with night rest	2 points
C3	Edema that persists with night rest	3 points
C4	Fibrotic edema	4 points
C5	Elephantiasis with skin lesions	5 points

Table 4

Lower Limb (LL)	Upper Limb (UL)
FOOT (1 point)	HAND (1 point)
LEG (1 point)	FOREARM (1 point)
THIGH (1 point)	ARM (1 point)
GENITAL (1 point)	SHOULDER (1 point)
TRUNK (1 point)	

Table 5

Group 1 (Diamagnetotherapy + Compression)	Group 2 (Compression)
C2 3 limbs	3 limbs
C3 15 limbs	14 limbs
C4 3 limbs	4 limbs

In a second step the patients, recruited according their class, were randomized to get homogeneous samples for a more reliable final evaluation. The echography was performed using a 7.5 - 10 MHz probe with Kontron Sigma and Philips 7.5 - 10 MHz devices. The exploited parameters were the subcutaneous tissue thickness, the presence of hyperechogenicity in the sub-cutis (signifying the presence of free lymph, that is, “lymphatic holes”) (24). We considered the interstitial trabecular meshworks that at this stage appear thickened, hyperechogenic and fragmented. Using a limb echographic mapping we observed high fibrosis and lymphatic accumulation areas; the same issues were evaluated after the therapy.
Executive procedure: the application of diamagnetic therapy was performed according to the scheme: PEMF (Magnetic Field=2 Tesla; Intensity=90 J; frequency of impulses=7Hz; duration=30minutes/session), and diathermia with resistive system, electrical resistance of 500-1000 Ohm according to the measured impedance (the device is provided with an impedance detector that permits to highlight tissue areas with high resistance to magnetic fields, where it is necessary to increase the electrical resistance up to 1000 Ohm) plus compression.
The massage was performed following the lymphatic draining directions, in this way combining the advantage of the hand-made lymphatic drainage with the energy developed by the machinery (25).

The duration of diathermia application was 30-40 minutes and it was repeated three times per week for about two months (for a total of 20 applications).
The study was six months long in order to evaluate possible in-time negative effects of this therapeutic methodology.
Side effects: 4 patients (10% of the sample) showed, in the early stage of the therapy, a temporary warm sensation, nausea and urgent diuresis stimulus.

STUDY SELECTION CRITERIA

TYPES OF STUDIES, PARTICIPANTS AND INTERVENTIONS INCLUDED

Once included in the study, the patient was blindly assigned into the PEMF plus compression treatment group (Group 1) or the only compression group (Group 2) according to randomly generated numbers. The treatment commenced immediately after enrollment.

- In Group 1, the application of diamagnetic therapy was performed according to the scheme: PEMF (Magnetic Field=2 Tesla; Intensity=90 J; frequency of impulses=7Hz; duration=30minutes/session), and diathermia with resistive system, electrical resistance of 500-1000 Ohm according to the measured impedance (the device is provided with an impedance detector that permits to highlight tissue areas with high resistance to magnetic fields, where it is necessary to increase the electrical resistance up to 1000 Ohm) plus compression.
- In Group 2, only compression.

Therefore, patients were blinded to the treatment.

EXCLUSION CRITERIA

Before performing the treatments with PEMF CTU Medical Device – PERISO sa, all the patients received a clinical evaluation to detect:

- Unsuitable physiological states
- Presence of ferromagnetic material within the areas of the body to be treated.

Patients with Open Physis, terminal illnesses/malignancies, pregnancy or lack of contraception use in women of childbearing age, and use of pacemaker or any implanted electrical device were excluded, and ferromagnetic parts

BENEFIT/RISK

No Risks, Dangers, Adverse Reactions have been associated with the use of the CTU Medical Device – PERISO sa, even outside the protocols used. The CTU Medical Device PERISO sa, respects all CLINICAL SAFETY Standards.

TYPES OF OUTCOME MEASURES

All patients were clinically evaluated using a standard procedure we proposed, see Table 2 (23), before recruiting, by an accurate clinical examination and instrumental exams (lymphoscintigraphy, soft tissues echography, echodoppler). In addition, the limb's circumference was measured in specific positions before and after the treatment (60 days).

RESULTS

Clinical (limb's circumferences and consistency) and instrumental (soft tissues echography) controls showed a positive result in patients treated both by PEMF CTU Periso sa, and compression with respect to those treated only by compression.
The clinical improvements, revealed by using the very reliable CEAP-L classification, are summarized in the following table 6

Table 6

	Group 1 (T0)	Group 1 (T1*)	Group 2 (T0)	Group 2 (T1*)
C2	3	6	3	3
C3	15	15	14	15
C4	3	0	4	3

These results deserve an in-depth analysis. Indeed, even if they could appear of an ordinary level, they actually are not. In the group 1 (diathermia + compression) we obtained in the totality (3 limbs, 100%) of class C4 limbs a regression of trophic troubles like lymphatic ulcers. As a consequence of this improvement in the disease, they were declassed to a C3 class. This result is, in our opinion, of great clinical significance. The same happened to the three patients (20%) that moved from C3 class to the C2 one. On the other hand, by using only the compression therapy the clinical outcomes were basically irrelevant.
To make the results more meaningful we also used a clinical gravity score, that led to the following data (Tables 7, 8):

Table 7

CLINICAL GRAVITY SCORE
1 point for each area of the lim b involved
1 point for each lim b involved
2 points for other areas involved (genitals, shoulders)
1-4 points according to the stage of ede m a
1 point sy m pto m atic ede m a
1-3 points according to the stage of disability

Table 8

Clinical gravity score	Group 1 (T0)	Group 1 (T1*)	Group 2 (T0)	Group 2 (T1*)
5	5	8	3	3
6	11	11	12	13
7	0	1	2	1
8	2	1	0	1
9	3	0	4	3

Instrumental evaluations:
Together with a decrease in the oedema volume, patients treated by diathermia + compression (Group 1) showed a meaningful decrease of tissue's consistency (hard oedema becoming soft oedema). In details, the echographis evaluations pointed out an improvement in the echographic derma and hypoderma structure, with more homogeneous and thinner connective shoots, an hypo- anechogenic appearance of the superficial loose cellular tissue, a reduction of the connection synechiae between derma and hypoderma and between hypoderma and superficial muscular fascia, with a consequent better excursion of the muscular district. In addition, at the end of each treatment cycle we observed a reduction of the lymphatic holes and lakes (26), with a consequent decrease of the circumference measures [cB (ankle) = –3 cm; cD (knee) = –4 cm; cG (thigh root) = –6 cm] (Fig. 2) e [cC (wrist)
= –2 cm; cE (elbow) = –3,5 cm; cG (arm) = –5 cm] (Fig. 3) and most of all the transformation of a hard oedema in a soft one. In this way, the limb became more compressible (decrease in the tissue stiffness) leading to a better response to the compression therapy (27)7

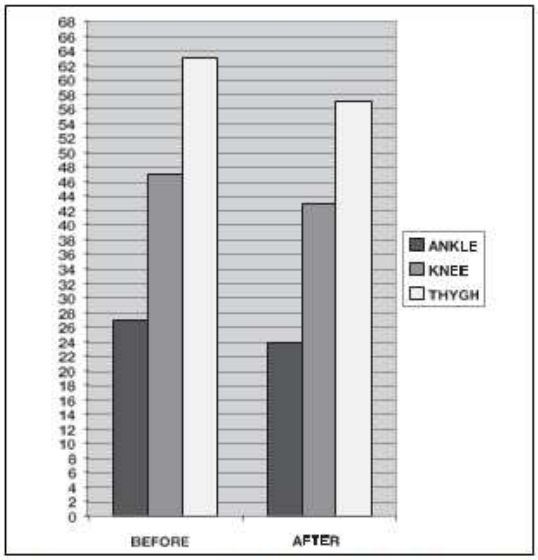

Fig. 2 - Average decrease in the inferior limb's circumferences measures.

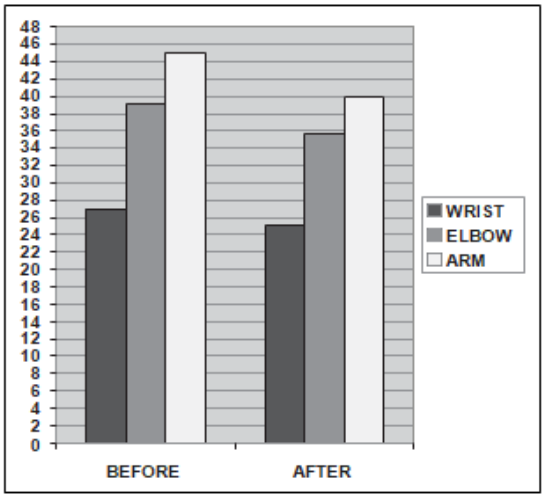

Fig. 3 - Average decrease in the superior limb's circumferences measures.

DISCUSSION

The data we obtained confirm the validity of the therapeutic approach (CTU Medical Device – PERISO sa), even it is certainly integrable with all other therapeutic treatments of oedema, in general, and of lymphoedema, in particular (28). It has shown its efficiency thanks to the different and synergic actions (diamagnetic force acting on the water, thermal effect and possible pharmacologic subcutaneous transport), that led to good results, both on clinical and on instrumental side. In particular, in Group 1 we observed a clear clinical improvement with respect to Group 2, testified by the CEAP-L classification and by the clinical gravity score, as well as an instrumental improvement pointed out by echographic images (29). The safety (30) of the technique, moreover, has been benchmarked by the absolute irrelevance of registered side effects.

CONCLUSION

In conclusion, the patients satisfaction and the objective improvement in both clinical and instrumental data, together with its simplicity, make the proposed technique, possibly integrated with other approaches, a new fundamental tool in the therapy of lymphoedema.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this paper.

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ANNEX 1

FORMATO EUROPEO PER IL CURRICULUM VITAE

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	1990 Azienda Sanitaria Locale della Provincia di Varese- Via O. Rossi 9- Varese Igiene Pubblica Assistente Medico Supplente (Incarico a Termine)
• Nome e indirizzo del datore di lavoro	Dal 1988 al 1993 Ministero di Grazia e Giustizia – Dipartimento dell'Amministrazione Penitenziaria- Casa Circondariale di Busto Arsizio (VA) Medico del Servizio di Assistenza Sanitaria Integrativa
• Tipo di azienda o settore • Tipo di impiego • Principali mansioni e responsabilità	
ISTRUZIONE E FORMAZIONE • Date (da – a)	2008 Bologna – Scuola di Ecografia Muscolo Scheletrica Corso Avanzato 2006 e 2007 Bologna – Scuola di Ecografia Muscolo Scheletrica Corso Base 1992 Diploma di Specializzazione in Ortopedia e Traumatologia Università degli Studi di Milano 1984 Abilitazione Professionale Università degli Studi di Pavia 1984 Diploma di Laurea in Medicina e Chirurgia Università degli Studi di Pavia 1977 Diploma di Maturità Scientifica Liceo "F.lli Vianeo" Tropea (CZ)
• Nome e tipo di istituto di istruzione o formazione • Principali materie / abilità professionali oggetto dello studio • Qualifica conseguita • Livello nella classificazione nazionale (se pertinente)	

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CAPACITÀ E COMPETENZE ORGANIZZATIVE

ULTERIORI INFORMAZIONI

Affiliazione a società scientifiche
SIOT (Società Italiana Ortopedia e Traumatologia)
ASON (Associazione Specialisti Osteoarticolari Nazionale) – Referente regionale per la Lombardia biennio 2015-2017
SITOD (Società Italiana di Terapia con Onde d'Urto).
Componente del Consiglio Direttivo biennio 2008-2010, biennio 2010-2012 biennio 2012-2014 , biennio 2014-2016 , biennio 2016-2018
ISMST (International Society for Medical Shock Wave Treatment)

Il sottoscritto è a conoscenza che, ai sensi dell'art. 76 del DPR 445/2000, le dichiarazioni mendaci, la falsità negli atti e l'uso di atti falsi sono puniti ai sensi del codice penale e delle leggi speciali. Inoltre, il sottoscritto autorizza al trattamento dei dati personali, secondo quanto previsto dalla Legge 196/03.

CITTA' __Varese_____

DATA___07/08/2017 _____

NOME E COGNOME (FIRMA)

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CAPACITÀ E COMPETENZE PERSONALI

Acquisite nel corso della vita e della carriera ma non necessariamente riconosciute da certificati e diplomi ufficiali.

Italiano

Dal 1995 al 2016 interesse e competenze specifiche nel campo dell' Ortopedia applicata alla Medicina Legale quale consulente di compagnie assicurative (1995 – 2008) dell' Istituto Nazionale Assicurazione Infortuni sul Lavoro (INAIL) , consulente tecnico per la branca di Ortopedia presso il Tribunale di Varese sino al mese di ottobre 2015.

Dal 2004 interesse nella Terapia con Onde d'urto Extracorporee utilizzando apparecchiature focalizzate piezoelettrica ,elettromagnetica ed elettroidraulica . Esperto in trattamenti ecoguidati ed eco-assistiti *manu medica*, per il trattamento delle principali patologie muscolo scheletriche, inclusi i ritardi di consolidazione delle fratture , la patologia vascolare e metabolica dell'osso le osteocondropatie e il trattamento delle ulcere cutanee . Dal 2010 attività di ricerca clinica e sperimentale presso il Dipartimento di Ortopedia e Traumatologia dell'Università degli Studi di Milano dell' Istituto Ortopedico Galeazzi (Direttore prof V. Sansone) che riguardano l'impiego delle energie fisiche nella patologia metabolica , degenerativa e vascolare dell'osso , gli effetti su colture di cellulari (Centro di Ricerca Applicata sulla Stimolazione Biofisica dei Tessuti Muscolo-Scheletrici)

Coautore di pubblicazioni in materia su riveste nazionali e internazionali indicizzate . Relatore – moderatore in congressi e corsi di formazione

PRIMA LINGUA	Italiano
ALTRE LINGUE	
	Inglese
• Capacità di lettura	Buona
• Capacità di scrittura	Buona
• Capacità di espressione orale	Discreta

Ha maturato negli anni capacità di lavoro individuale e in equipe

CAPACITÀ E COMPETENZE RELAZIONALI

Vivere e lavorare con altre persone, in ambiente multiculturale, occupando posti in cui la comunicazione è importante e in situazioni in cui è essenziale lavorare in squadra (ad es. cultura e sport), ecc.

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2012 TORINO XI CONGRESSO NAZIONALE SOCIETA' ITALIANA TERAPIA CON ONDE D'URTO EXTRACORPOREE (SITOD)
P. Romeo. La terapia con onde d'urto extracorporee. L'Operatore. Figure professionali coinvolte e specificità operative

2012 TORINO XI CONGRESSO NAZIONALE SOCIETA' ITALIANA TERAPIA CON ONDE D'URTO EXTRACORPOREE (SITOD) CONVEGNO SATELLITE: LE ONDE D'URTO IN PATOLOGIA ORTOPEDICA
P. Romeo. La Terapia con Onde d'Urto. Indicazioni Controindicazioni Aspetti Medico Legali.

2012 – ROMA 4° CONGRESSO NAZIONALE C.O.R.T.E
P. Romeo – MC D'Agostino, Onde d'Urto e Rigenerazione tissutale, il ruolo dell'Angiogenesi

2012- INNSBRUCK 2nd ISMST Basic Research Meeting
MC D'Agostino. P. Romeo. Early angiogenic response to shock waves in a three – dimensional model of microvascular endothelial cell culture (HMEC-1)

2011 - SANTA MERGHERITA LIGURE (GE) INDICAZIONI E LIMITI DELLA TERAPIA CON ONDE D'URTO: DAL MEDICO DI MEDICINA GENERALE ALLO SPECIALISTA.
- P. Romeo. Indicazioni Controindicazioni e modalità di somministrazione della terapia con onde d'urto. Linee guida

2011 VARESE AGGIORNAMENTO DEL MEDICO DI MEDICINA GENERALE
- L'Edema Osseo Midollare nelle patologie Osteoarticolare. Aspetti prognostici e Terapeutici

2011 BERGAMO TERAPIA CON ONDE D'URTO: DALLA RICERCA ALLA PRATICA CLINICA. INDICAZIONI
- P. Romeo Effetti Biologici delle Onde d'Urto Extracorporee. I Meccanismi della risposta cellulare.

2010/2011 MILANO – I CORSO AVANZATO SULL'UTILIZZO DELLE ONDE D'URTO EXTRACORPOREE IN ORTOPEDIA-FISIATRIA E MEDICINA RIGENERATIVA

-P. Romeo, V. Sansone Effetti Biologici della Stimolazione con Onde d'Urto. I meccanismi dell'azione terapeutica.
-P. Buselli, P. Romeo. Aspetti Medico Legali delle Terapia e raccolta del consenso informato.
- P. Romeo, V. Sansone. Onde d'Urto extracorporee e patologie vascolari dell'osso. Il razionale terapeutico
-P. Romeo, V. Sansone Le Onde d'Urto nella patologa dell'Achilleo. Dalla biologia alla pratica clinica.

2010 BARI. X CONGRESSO NAZIONALE SOCIETA' ITALIANA TERAPIA CON ONDE D'URTO EXTRACORPOREE (SITOD)
- P. Romeo, Indicazioni Controindicazioni, Utilità, Inutilità nelle applicazioni cliniche (o routinarie) delle onde d'urto focalizzate.

2010 SANTA MARGHERITA LIGURE (GE) NUOVE FRONTIERE NEL TRATTAMENTO DELLE PATOLOGIE ORTOPEDICHE CON ONDE D'URTO ED INGEGNERIA TISSUTALE ON LINE
- P. Romeo. V. Sansone. M.C. D'Agostino Onde d'Urto e Angiogenesi, Considerazioni clinico sperimentali.

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2010 VIENNA 1 th ISMST (International Society for Medical Shock Waves Treatments) BASIC RESEARCH MEETING
M.C. D'Agostino – P. Romeo. Osteogenesis and Bone Turnover

2009 CAMPOBASSO XXXVII SIMFER. SOCIETA' ITALIANA MEDICINA FISICA E RIABILITAZIONE
M. C. D'Agostino, P. Romeo. V. Sansone
Onde d'Urto Extracorporee dalla litotripsia alla rigenerazione tissutale. Sessione Poster

2007 VII CONGRESSO NAZIONALE SOCIETA' ITALIANA TERAPIA CON ONDE D'URTO EXTRACORPOREE (SITOD)
L. Polo – P. Romeo
Effetti secondari e applicazioni "off label "delle Onde d'urto. Sperimentazione e aspetti Medico Legali

Varese 07/08/2017

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