

EXTRACORPOREAL SHOCKWAVE THERAPY IN 2008

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Over the past years Shockwave Therapy showed an important development and its fields of application extended beyond urology and chronic soft tissue diseases; as a result recently a decision was made to change the name of our International Society for Musculoskeletal Shockwave Therapy into International Society for Medical Shockwave Treatment. The working mechanisms of shockwaves were further explored ; however, it seems that orthopedists in France are not aware of the existence and benefits of shockwave procedures and, consequently, the manufacturers of shockwave systems have turned away from the French market. We hope, however, that the organization of the 11th ISMST Congress in Juan les Pins may mean a new impulse to introduce and promote Shockwave Therapy to the medical community

FOCALIZED SHOCKWAVES AND RADIAL SHOCKWAVES : WHAT ARE THE DIFFERENCES ?

The confusion between Focalized Shockwaves (acoustical waves) and Radial Shockwaves (mechanical waves) was a disaster for all; we do not classify Strontium Ranelate as a Biphosphonate pretending that it also treats Osteoporosis, or similarly Methotrexate as a Biotherapy. In doing this there are serious consequences with respect to the acting mode and secondary effects, besides there differences in monitoring. Stating that Radial Shockwaves are not shockwaves does not imply that they have no therapeutical effects. However the term shockwave should not be used for these systems ; in stead pressure wave is more appropriate, the more as in new applications such as dermatology the acoustical shockwave systems use defocalized shockwave applicators

Acoustic and cavitation fields of three shock wave therapy devices (R. Cleveland, P. Chitnis, S. Mc Clure) (10th ISMST CONGRESS 2007 TORONTO

This study, carried out in the Aerospace Research department of the Boston University, had as objective to measure shockwaves originating from three different shockwave sources, EvoTron and OssaTron (both acoustic waves) and Dolorclast (mechanical waves). The authors could not discover shockwaves produced by the Dolorclast, not even when applying a new focalization head. The authors concluded that the therapeutic effects observed with the Dolorclast, should originate from other mechanisms than Shockwaves.

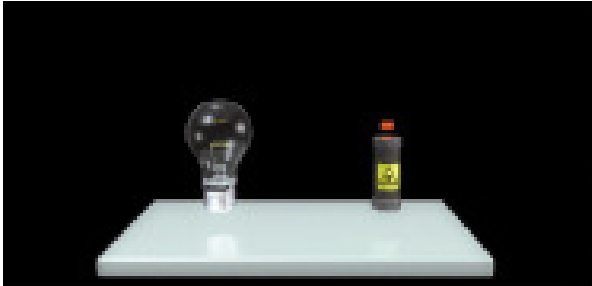
Shock and Pressure Waves - magic tools in medicine (O. Wess) (9th ISMST CONGRESS 2006 RIO)

As the author declared, an electric light bulb and a laser produce light, but this does not imply that a light bulb is a laser; shockwaves and pressure waves have common indications such as in tendonitis and pain treatments, but they have different properties and action modes ; there are certain shockwave applications which under no circumstances should be done with pressure waves. (pseudartrosis, AVN, osteochondrosis, Osgood Schlatter, ulcers)
Images 1 – 8 show the differences between Shockwaves and Pressure Waves

Image 1

Compare

"Shockwaves" with "Pressure waves"
similar to
a "Light bulb" with a "Laser"



Both generate light, but with different properties and qualities.

Question:

May we call a light bulb a laser ?

Image 2: Pressure Waves



WORKING MECHANISMS OF SHOCKWAVES

Nitric Oxide and shockwaves

(Dr. Ferid Murad, Nobel Price Laureate of Medicine 1998)
(10th ISMST CONGRESS 2007 TORONTO)

Extracorporeal shockwaves manifest themselves as biological mechanotransduction

(H. Neuland, H. Duchstein) (9th ISMST CONGRESS 2006 RIO) e
(10th ISMST CONGRESS 2007 TORONTO)

Nitric oxide and shockwaves : another brick in the wall

(E. Amelio) (9th ISMST CONGRESS 2006 RIO)

Image 3: Pressure Waves



The above series of studies does not focus on a mechanical action but on a biological mechanotransduction, in which the main actor is the induction of a production of NO (Nitric Oxide);

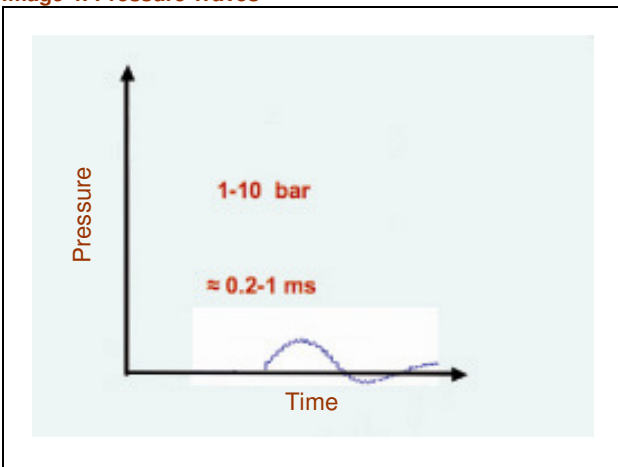
NO is a biological molecule with the chemical formula of an Oxygen and a Nitrogen Atom. At room temperature and normal atmospheric pressure Nitric Oxide is a colorless gas. It is an important and rare neurotransmitter of mankind in a gas-state.

NO plays an important role in many physiological functions.

In the vascular system, NO maintains a vasodilator tone that is essential for the regulation and circulation of the blood flow and control of the arterial pressure.

In the central nervous system, it acts as a neuro-mediator, whose functions include the formation of memory, coordination between neuronal activities and blood flow, modulation of pain.

Image 4: Pressure Waves



In the peripheral nervous system, NO released by nitrergic nerves mediates some forms of neurogenic vasodilation and regulates certain gastrointestinal, respiratory and genitor-urinary functions. In addition, NO is generated in large quantities during host defense and immunological reactions and is involved in the pathogenesis of conditions such as septic shock and inflammation.

The Nobel Laureate in Medicine or Physiology for 1998 was awarded to Ferid Murad, Robert Furchgott, et Louis Ignarro for their discoveries concerning "the Nitric Oxide as a signaling molecule in the cardiovascular system".

Dr. Ferid Murad honoured us at the 10th ISMST Congress, with a presentation linking NO and Shockwaves.

Image 5: Shockwaves

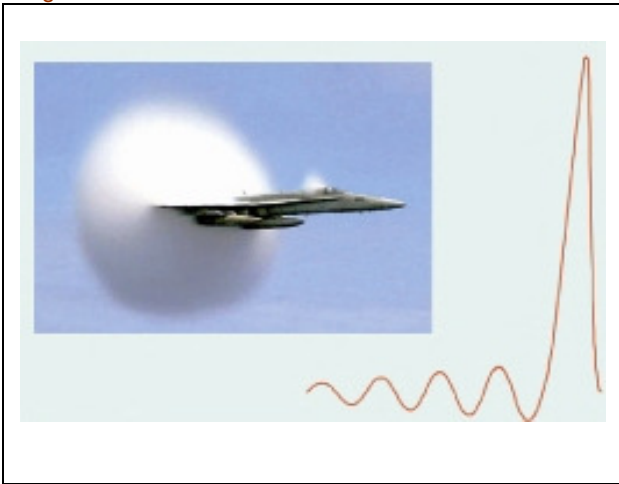


Image 8: Shockwaves

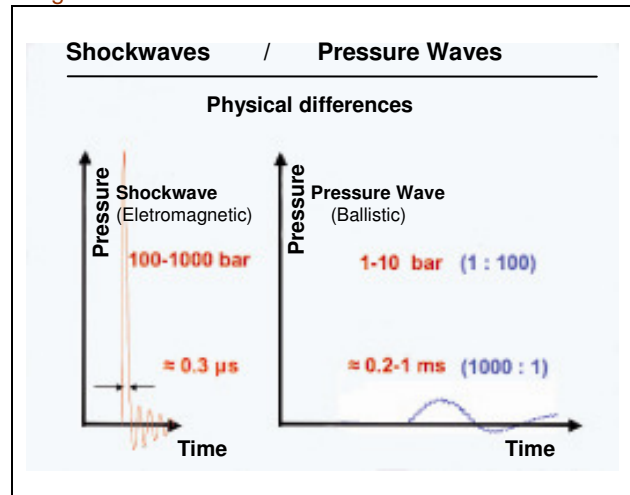


Image 6: Shockwaves

Principles of Generating Shockwaves

Electro- Hidraulic	Piezo-Electric	Electro-Magnetic	
HMT SwiTech MTS SanuWave Direx Medispec	Wolf	Siemens Dornier	Storz
1980	1985	1986	1989

Image 9: Shockwaves

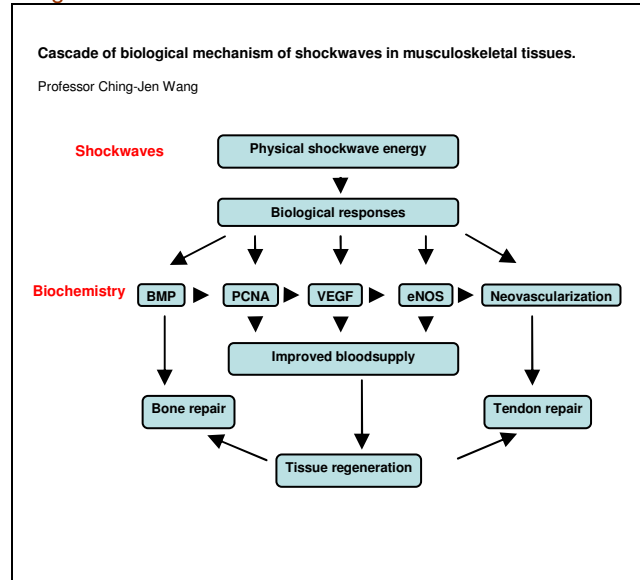
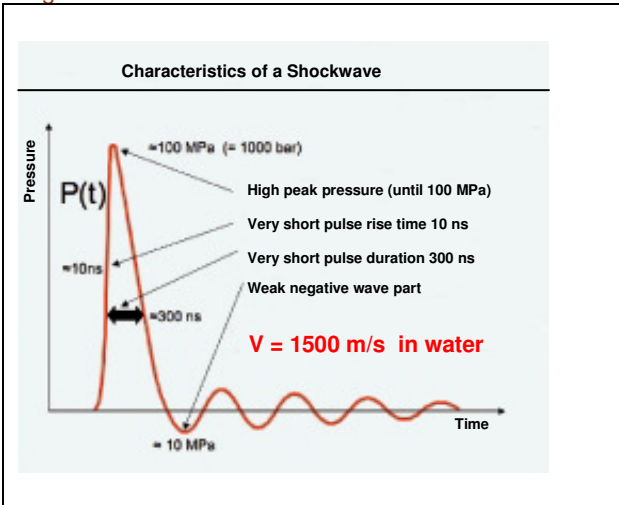


Image 7: Shockwaves



NEW APPLICATION FIELDS OF SHOCKWAVES: RHEUMATOLOGY

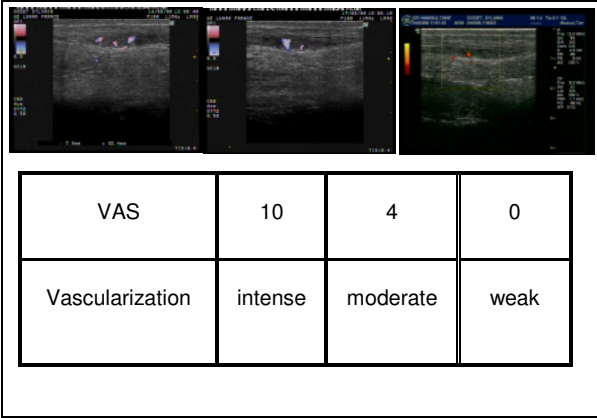
Results of the combined treatment with radial and focussed shockwaves in patients with chronic cervical pain (M. Gleitz) (10th ISMST CONGRESS 2007 TORONTO)

Treatment of chronic lumbar pain with radial shockwaves (P. Kertzman, J. Fugukawa) (9th ISMST CONGRESS 2006 RIO)

Many presentations supported the efficacy of shockwaves in the classical and approved indications (see further below) and even good results with pressure waves for the tendonitis indication.

We noted the shockwave and, in particular, pressure wave applications for triggerpoints (myofascial pain syndrome, chronic cervical and lumbar pain), which formed part of a workshop and presentation by Dr. Markus Gleitz.

Image 10



Osteochondral lesions as an indication for ESWT (R. Thiele, S. Marx) (9th ISMST CONGRESS 2006 RIO).

Two Years results of patients with gonarthrosis treated with intermittent extracorporeal shockwaves and intra-articular application of hyaluronic acid (A. Lang, H. Neuland) (9th ISMST CONGRESS 2006 RIO).

Studies were presented about the Morton Neuroma, Sesamoiditis, Sclerodermi calcifications, Kienböck disease, and Dermatomyositis.

Furthermore studies on the efficacy of Shockwaves on Osteochondral lesions and Gonarthrosis (osteoarthritis of the knee), followed by MRI and arthroscopy by the German groups.

Évaluation with ultrasound and color doppler of results of ESWT for the control of hypervascular areas in tendinosis (R. Hamisultane) (9th ISMST CONGRESS 2006 RIO)

A study on the effects of shockwaves applied to the neo vessels of chronic Achilles tendinosis, monitored under Power Doppler Ultrasound, showed a reduction and disappearance of the neo-vessels correlating with the reduction and disappearance of pain. (see image 10)

DERMATOLOGY :

Numerous studies have shown the efficacy of shockwaves on skin ulcers, burn wounds and cicatrizations.

These areas originated from the industrial development of defocalized and planar shockwave applicators. (images 11 et 12).

ESWT for chronic skin lesions (W. Schaden and all) (9th ISMST CONGRESS 2006 RIO).

Non-focused ESWT & skin ulceration in complex neurological disabilities (K. Andrews, A. Larking) (10th ISMST CONGRESS 2007 TORONTO).

Accelerated wound recovery in treatment of burn wounds using ESWT (R. Thiele and all) (10th ISMST CONGRESS 2007 TORONTO).

Image 11:



Image 12



NEUROLOGY:

Animal studies opened new and promising horizons for spinal and peripheral nerve lesions, and even parodontopathologies.

ESWT in peripheral nerve repair (W. Schaden and all) (10th ISMST CONGRESS 2007 TORONTO).

Application of ESWT to enhance spinal fusion : a rabbit experiment (T. Lee, C. Wang) (10th ISMST CONGRESS 2007 TORONTO).

ESWT induces alveolar bone regeneration in experimental periodontitis (S. Sathishkumar and all) (10th ISMST CONGRESS 2007 TORONTO).

WHO SHOULD PERFORM SHOCKWAVE THERAPY

O Dr. Markus Gleitz (Luxemburg) brought forward the problem of the use of shockwave therapy by non-medical staff; according to the European directives (http://ec.europa.eu/enterprise/medical_devices/legislation_en.htm), shockwave as well as pressure wave devices are classified as **class 2b**, due to the potential dangerous energy for patients. «hazardous energy».

However, devices for physiotherapy (electrotherapy, ultrasound) are classified as **class 2a** as they do not emit hazardous energy.

In Italy only medical doctors are authorized to operate and use shockwave devices.

RECOMMENDATIONS AND CONSENSUS OF THE ISMST

The ISMST, stimulated by the German Shockwave Society (DIGEST) and Prof. Rompe, issued consensus recommendations which will be validated at the 11th Congress in Juan les Pins, which will be held from 5th until 7th of June 2008 with the support of the French Federation of Rheumatology; this will be an opportunity for all medical doctors who are interested in shockwave therapy.

Inscriptions: www.ismst.com and <http://web.mac.com/ondesdech.oc.france>



International Society for Medical Shockwave Treatment

Introduction

Building on the experience gained over the past 15 years, the President of the ISMST, with the backing of the Managing Board and experts from National Shockwave Societies around the world, have put together a set of recommendations for the use of shockwave therapy.

Prerequisites

In order to prevent improper treatment the following are prerequisites for administering the technology: In addition to a clinical examination, a medical imaging, neurological and laboratory-diagnostic test may be necessary to corroborate the diagnosis.

Only a qualified (certified) physician may use shockwave therapy to treat pathologies, which have been determined by diagnostic testing.

For the treatment of bone ailments, a high-energy, focused shockwave with positioning technology is to be used. To treat superficial, soft tissue conditions, devices with or without focusing technology may be utilized; close attention must be paid to the depth of penetration of the shockwave source when treating deep tissue structures.

1) Approved standard indications

- a) Chronic tendinopathies
 - Plantar fasciitis with or without heel spur
 - Achilles tendon
 - Rad. epicondylopathy (tennis elbow)
 - Rotator cuff with or without calcification
 - Patella tendon
 - Greater trochanteric pain syndrome
- b) Impaired bone healing function
 - Delayed bone healing
 - Stress fractures
 - Early stage of avascular bone necrosis (native X-ray without pathology)
 - Early stage osteochondritis dissecans (OD) post-skeletal maturity
- c) Urology : Lithotripsy (extracorporeal and endocorporeal)

2) Common empirically-tested clinical uses

- a) Tendinopathy
 - Ulnar epicondylopathy
 - Adductor syndrome
 - Pes anserinus syndrome
 - Peroneal tendon syndrome

- b) Muscular pathologies
 - Myofascial syndrome (fibromyalgia excluded)
 - Injury without discontinuity
- c) Impaired wound healing
- d) Burn injuries
- e) Salivary stones

3) Exceptional indications/expert indications

- a) Spasticity
- b) Early stage osteochondritis dissecans (OD) pre-skeletal maturity
- c) Apophysitis (Osgood Schlatter disease)
- d) Peyronie's disease (IPP)

4) Uses under experimental conditions

- a) Myocardial ischemia (extracorporeal/endocorporeal)
- b) Peripheral nerve lesions
 - c) Abacterial prostatitis
 - d) Periodontal disease
 - e) Osteoarthritis