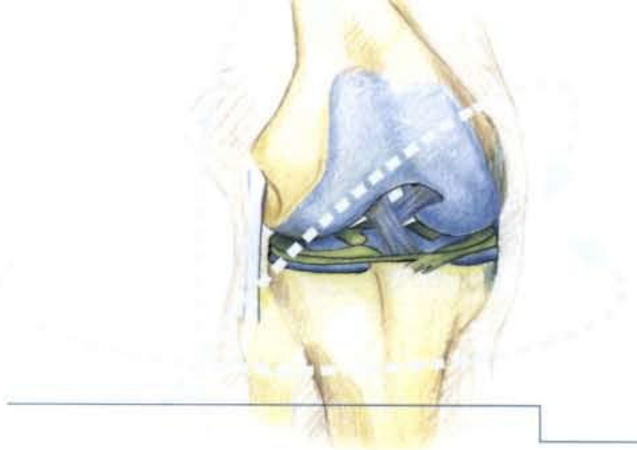
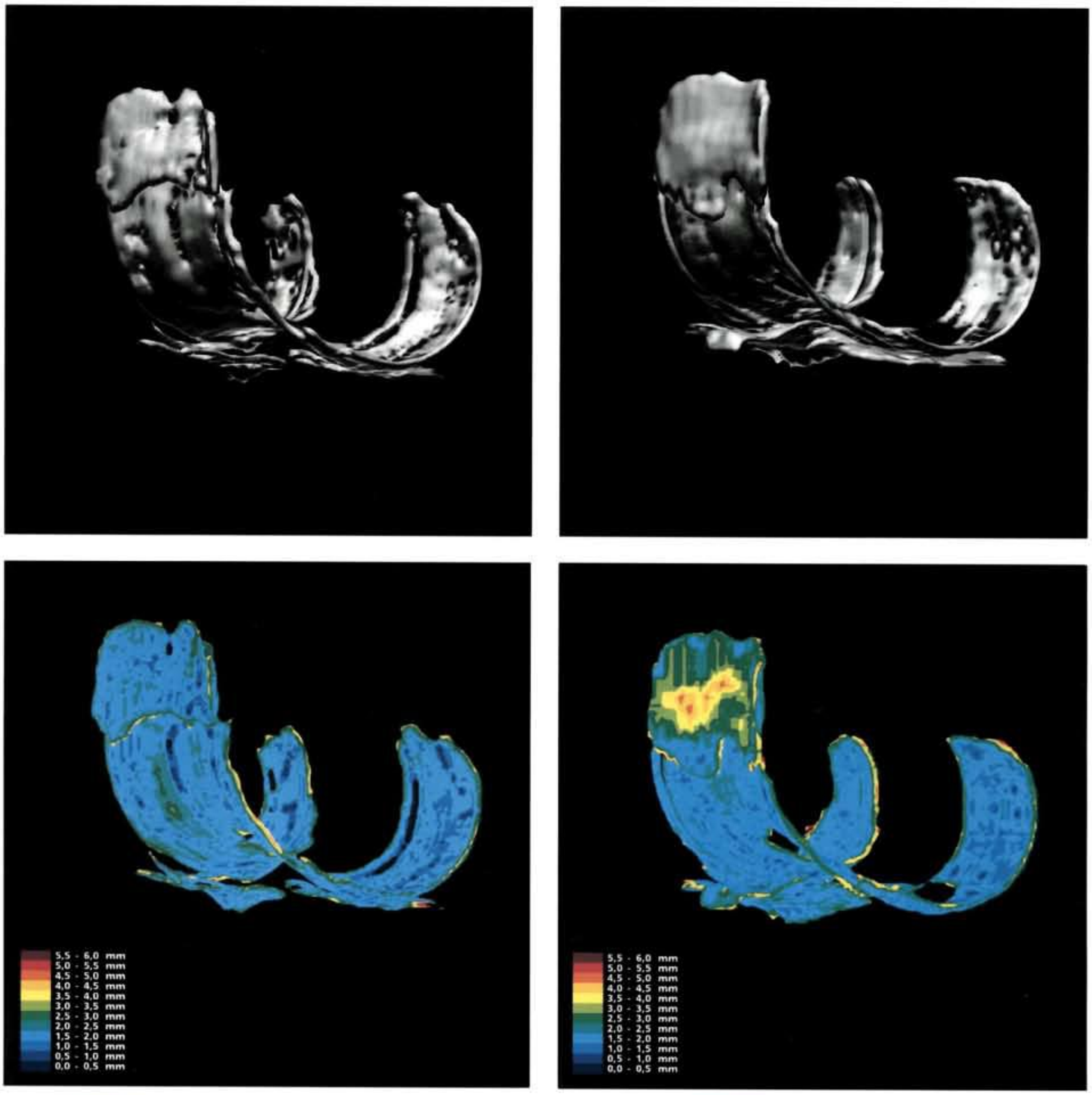


A treatment for cartilage regeneration

First scientific study of the therapeutic applicability of nuclear magnetic resonance signals (MBST® -NuclearMagneticResonanceTherapy) to cartilage structures in vivo!



Before MBST® -Therapy

10 weeks after MBST® -Therapy

MEDTEC Medizintechnik GmbH

First scientific study of the therapeutic applicability of nuclear magnetic resonance signals (MBST®-NuclearMagneticResonance-Therapy) to cartilage structures *in vivo*!

A scientific study entitled „Evaluation of the effectiveness of complex pulsating electromagnetic fields (PEMF) of the MBS-therapy (**MBST®-NuclearMagneticResonanceTherapy**) in respect to the regeneration of cartilage structures" was carried out by Prof. Froböse *et al.* in 1999, and published in Orthopädische Praxis, Volume 36, No. 8, pages 510515 (2000).

The patients treated in the study had clinically confirmed histories of gonarthrosis (Wirth stages II and III). Cartilage structures were three-dimensionally imaged and quantified throughout the study by using MRT (Magnetic Resonance Tomography). This was the first documentation of such *in vivo* results.

The patients were treated with the recently developed **MBST®-NuclearMagneticResonanceTherapy** procedure (using an appliance supplied by MedTec Medizintechnik GmbH, Wetzlar, Germany). The treatment consisted of nine consecutive therapy sessions, and led to distinct improvements in the thickness, volume, and surface area of the cartilage structures.

Distinct regenerative processes of the cartilage structures!

In discussing the highly significant results of the study, Prof. Froböse stated that the improvements were caused by special features of the **MBST® -NuclearMagneticResonance-Signals**. He proceeds by stating: "In this study, the impact of a treatment with nuclear magnetic resonance signals *in vivo* could be quantitatively evaluated for the first time. Before the study, the female patients treated with **MBST®-NuclearMagneticResonanceTherapy** showed cartilage defects that, in some instances, were considerable. After the therapeutic intervention, the values were nearer to the normal reference data. Regenerative processes within the cartilage structures were evident and corresponded to the subjective feedback given by the female patients. It should be noted that there is a possibility that the process of cartilage regeneration had not even been terminated at end of the 10-week duration of our study. This question remains to be answered."

Cartilage regeneration through MBST®-NuclearMagneticResonanceTherapy as documented by Magnetic Resonance Tomography – A case study

Dr. med. G. Breitgraf, ReAgil Therapy Centre, Cologne, Germany.

The therapy was carried out on a 46 year old, female patient with a 12 year long history of severe discomfort in the right knee joint, the major discomfort being a strong feeling of pressure and burning after longer periods of walking. In accordance with the Lequesne index (1982) the following handicaps in day to day life were present: pain during night resting and when not moving; pain starting with the initial 2-3 steps in the morning; pain on motion after walking distances of 4 km or more: occasional piercing pain or sudden loss of strength in right leg; problems when squatting.

The physical examination led to only a few relevant results: a distinct reduction of mobility with F/E 140/10/0~ and extension pain on the right hand side, compared to painless mobility on the left hand side with F/E 140/0/10∞. The right thigh was 2.5 cm thinner than the left thigh. Examinations of the patella, ligaments, and meniscus on both knees were inconclusive.

The medical history of the patient showed that in 1971 she suffered a car accident in which her thigh was fractured. The fracture was treated surgically with a Küntscher nailing technique. Continuing discomfort in the right knee joint led in 1985 to arthroscopic surgery with abrasion arthroplasty, shaving and meniscus trimming. Examination during that surgical procedure showed a complete defect of the cartilage layer at the medial and lateral condyles of the femur, an intense reaction to wear of the cartilage in the area of stress, and damage to the inner meniscus.

As a therapy for the long history of discomfort, the patient was treated with 9 sessions of 1 hour each with the **MBST®-NuclearMagneticResonanceTherapy**. The treatments were carried out on consecutive weekdays.

For the first time ever, parameters of the patient's right knee joint cartilage were measured *in vivo* by MRT, before and 9 weeks after the **MBST®-NuclearMagneticResonanceTherapy**. The table below shows the measured values of tissue volume and mean thickness in four regions of the knee joint.

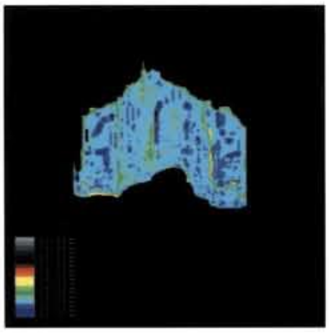
Measured Cartilage Values

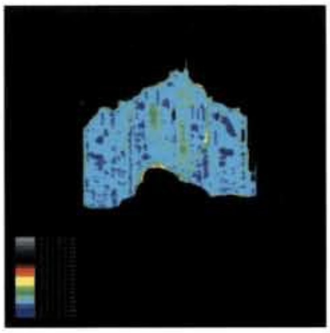
		Before Test	After Test	Difference (XNT-XVT)	Change in %
Patella	Volume	1,54 cm³	1,83 cm³	+ 0,29 cm³	+ 18,83 %
	Mean thickness	1,76 mm	2,07 mm	+ 0,31 mm	+ 17,61 %
Tibia lateral	Volume	0,64 cm³	0,80 cm³	+ 0,16 cm³	+ 25,00 %
	Mean thickness	0,94 mm	1,14 mm	+ 0,20 mm	+ 21,28 %
Tibia medial	Volume	0,73 cm³	1,05 cm³	+ 0,32 cm³	+ 30,48 %
	Mean thickness	0,96 mm	1,14 mm	+ 0,18 mm	+ 18,75 %
Femur	Volume	5,87 cm³	5,89 cm³	+ 0,02 cm³	+ 0,34 %
	Mean thickness	1,25 mm	1,38 mm	+ 0,13 mm	+ 10,40 %

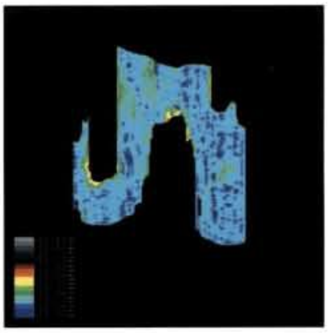
A three-dimensional representation of the isolated knee joint, made with a computer and a special differentiation procedure, allowed us to demonstrate the situation before and after MBST®.

The figures and the illustrations are quantitative proof that the **MBST®-NuclearMagneticResonanceTherapy** distinctly activates the metabolism of, and regenerates cartilage tissue. These data coincide with feedback from the patient, who reported distinct relief from discomfort.

Before Test


Femur frontal view


Femur back view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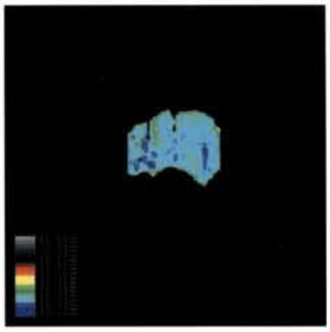
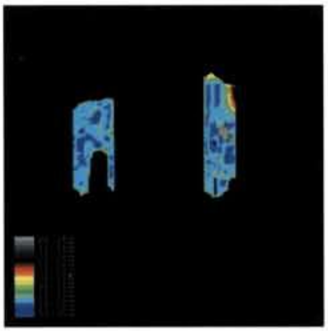
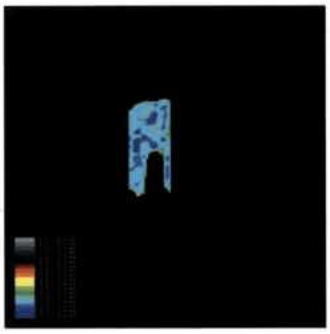
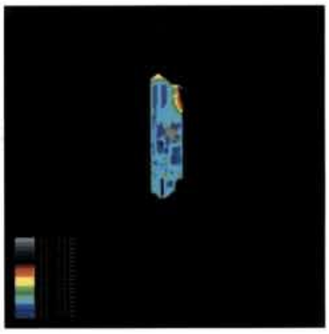
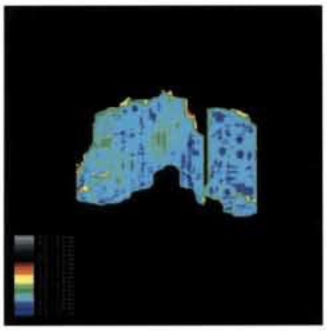

Patella back view

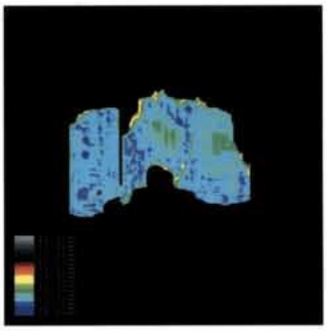

Tibia top view

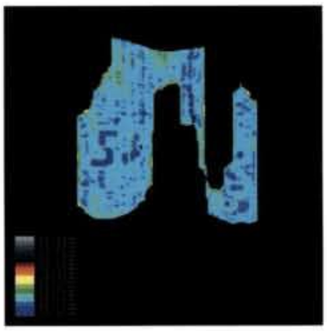

Tibia lateral top view


Tibia medial top view

After Test


Femur frontal view


Femur back view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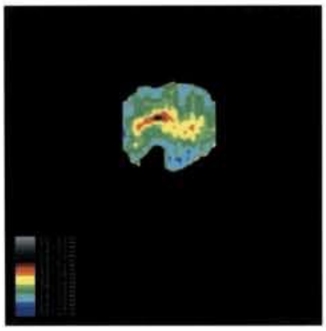
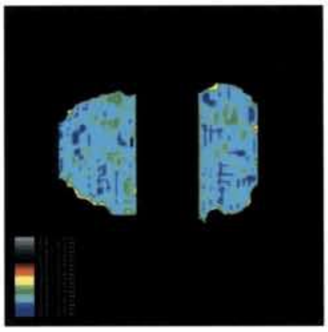
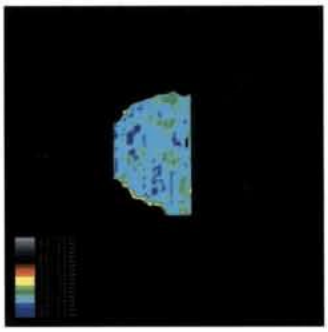
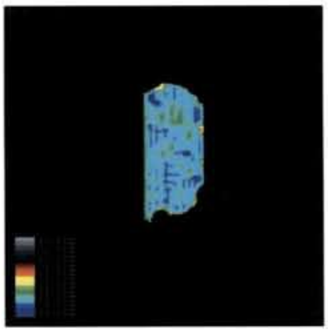

Patella back view


Tibia top view


Tibia lateral top view


Tibia medial top view

Nuclear Magnetic Resonance

The operating principle of the

MBST® -NuclearMagneticResonanceTherapy

Multidimensional polar axis of electromagnetic fields.

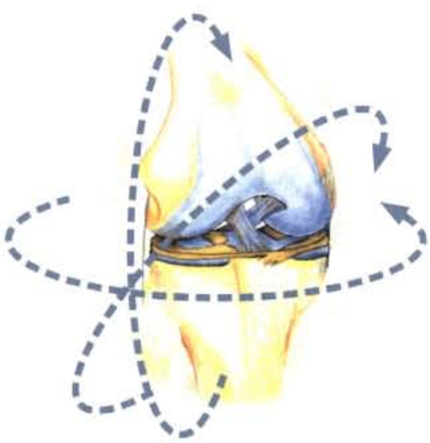
Hydrogen (H) nuclei behave like small magnets, which spin around their own polar axes. The positions of these spin axes in space are usually random, so that molecules containing hydrogen do not exhibit external magnetic characteristics.

However, when such molecules (for example cartilage tissue in a human body) are subjected to a nearly homogenous (static) magnetic field, the spin axes of the hydrogen nuclei (protons) align parallel to the magnetic field and precess at a frequency, known as the Larmor frequency, which depends on the strength of the external magnetic field.

If the hydrogen atom is subjected to an electromagnetic field that oscillates at the Larmor frequency, the field can transfer energy to the proton by inverting its spin direction. When the field is turned off, the proton spin decays back to its original direction and gives off the acquired energy to surrounding tissue.

When the field is turned off, the proton spin decays back to its original direction and by doing so transfers the higher energy into the surrounding tissue. The result is the following recurrent action: The electromagnetic energy of the therapeutic appliance raises the energy of the hydrogen protons. These pass energy on to their environment as their energy falls back to the initial ("ground state") value.

In this way, information for renewed synthetic activity can be transferred from the MBST® appliance to the cartilage tissue. It is the resonance between the proton spin precession frequency and the electromagnetic field frequency in the MBST®-NuclearMagneticResonanceTherapy appliance that allows the highest possible quantity of therapeutic energy to be transferred accurately into human tissue.



Clinical testing:	Therapy center ReAgil Cologne 1998
Project title:	Longterm evaluation of MBST®
Clinical tester:	Martha Krösche, Dr. Gisela Breitgraf
MRT study:	Deutsche Sporthochschule Köln (German Sports University Cologne)
Titel of the study:	Evaluation der Effektivität pulsierender elektromagnetischer Felder der MBST® auf die Regeneration von Knorpelstrukturen. (Evaluation of the Effectiveness of Three-dimensional Pulsed Electromagnetic Fields of the MBS-Therapy on the Regeneration of Cartilagenous Structures)
Author:	Prof. Dr. I. Froböse – 2000 (submitted 1999).

Specialists in the treatment of disorders of the joints, disorders of the jaw, osteoporosis, and tinnitus auritum.

Medizintechnik GmbH

Manufacturer MBST®
AD Elektronik GmbH
D-35583 Wetzlar
Sudetenstrasse 7-9 CE 0123

Central Office:
Gotenweg 51 · D-35578 Wetzlar (Germany)

Sales and Technical Support:
Spilburgstrasse 1 · D-35578 Wetzlar (Germany)
Phone: +49 (0) 64 41 / 6 79 18-0
Fax: +49 (0) 64 41 / 6 79 18-19
Internet: http://www.mbst.de · e-mail: medtec@mbst.de

Stand: 09.2003