

MBST®-NuclearMagneticResonanceTherapy improves rehabilitation outcome in patients with low back pain

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Introduction

Novel rehabilitation concepts are now being tested in order to develop new interdisciplinary approaches to reducing pain-induced disabilities. These concepts suggest that the treatment of low back pain should comprise several modalities, best achieved during a period of inpatient rehabilitation. The fact that classical physical therapy for chronic low back pain results in improvement of pain and in everyday function in only about one third of rehabilitation patients clearly demonstrates the need for novel measures in this field. Changes of tension within collagen structures caused by differences in mechanical stress induce the transport of electrical signals to and from the tissue structures and thus have a positive effect on the metabolism. It has been shown that pulsating electromagnetic fields (PEMF) induce positive biological reactions such as cell proliferation, matrix formation, etc. On the other hand, treatment of chronic low back pain with static magnetic fields must now be considered ineffective, the evidence is still lacking. A special form of nuclear magnetic resonance technique, a therapeutic procedure known as MBST®-NuclearMagneticResonanceTherapy, has been developed recently. The active principle is based on the same principles as nuclear magnetic resonance diagnostic systems (MRI). The MBST® appliances generate a static magnetic field and a 3-dimensional radio frequency field, leading to the build-up of a nuclear resonance field at the site of the treated tissue. The frequency and intensity of the electromagnetic field in the MBST® is adjusted appropriately to induce resonant vibration of molecular structures within cartilage or bone tissue, thereby stimulating cell proliferation.

Patients

62 patients suffering from low back pain (36 males, 26 females), and undergoing a three-week inpatient rehabilitation stay

Age: 18 - 71 years (mean 48.1 years)
 Disorders:
 diagnosed radiologically, by CT, or MRI:
 chronic low back pain (chronic lumbar syndrome) n = 52
 protruding intervertebral disk n = 7
 post-laminectomy syndrome after intervertebral diskectomy n = 6
 cervical syndrome n = 10
 (some of the patients suffered from a combination of these disorders)

Exclusion criteria:
 malignant infections, bacterial infections, rheumatoid arthritis, HIV-positive patients, disorders of the cardio-vascular system, arrhythmia, patients with a pacemaker, implanted cardioverter, insulin pumps, or total endoprosthesis of the hip, alcohol abuse, pregnancy, and lactation.

MBST®-NuclearMagneticResonanceTherapy system



Methods

MBST®-NuclearMagneticResonanceTherapy system:
 version KSRT-Key K1B, type MBST 600 KSRT, serial number 12100015
 MedTec Medizintechnik GmbH, Wetzlar, Germany

A special permanent magnetic field causes the protons of hydrogen atoms (hydrogen nuclei) to align their resonant axes along the field lines. A radio frequency (RF) field at the nuclear resonant frequency transfers energy to the protons and this extra energy is transferred highly effectively into the surrounding tissue. This added energy is therapeutic. In contrast to the PEMF methods currently in use, MBST® constructs complex 3-dimensional therapy fields with the help of twelve independent, and independently controlled, coil systems that are, in part, spaced in an orthogonal pattern, at angles of 90° to each other. Together with the permanent magnetic field, these 3-dimensional therapy fields form a nuclear resonance field in the centre of the coil system.

Statistics:
 SYSTAT vs. 9.0 Statistics for Windows (SPSS Inc., USA), and
 MedCalc Statistics for Biomedical Research vs. 5.0 (MedCalc Software, Belgium)

Roland - Morris Questionnaire

Total Scores from 24 Questions

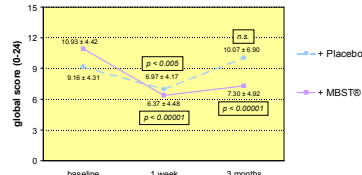


Figure 1

Roland - Morris Questionnaire

Question 6: „Because of my back, I lie down to rest more often.“

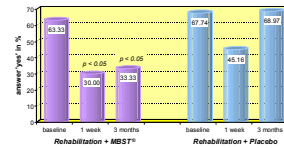


Figure 2

Roland - Morris Questionnaire

Question 7: „Because of my back, I have to hold on to something to get out of an easy chair.“

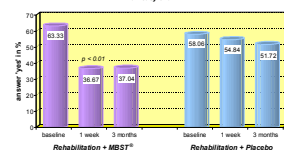


Figure 3

Roland - Morris Questionnaire

Question 9: „I get dressed more slowly than usually because of my back.“

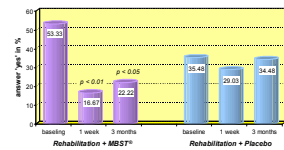


Figure 4

Roland - Morris Questionnaire

Question 12: „My back is painful almost all the time.“

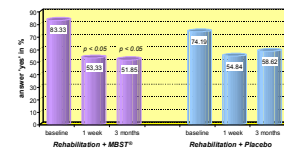


Figure 5

References

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- Froböse I, Eckey U, Reiser M, Glaser C, Englemer F, Assheuer J, Breitgraf G. Evaluation of the Effectiveness of Three-dimensional Pulsed Electromagnetic Fields of the MultiBioSignalTherapy on the Regeneration of Cartilaginous Structures. Orthopädische Praxis 2000;36(8):510-515.
- Roland M, Fairbank J. The Roland-Morris Disability Questionnaire and the Oswestry Disability Questionnaire. Spine 2000;25(24):3115-3124.
- Schreiber B, Bandemer-Greulich U, Uhlmann K, Müller K, Müller-Pfeil J, Kreuzfeldt A, Fikentscher E, Bahke U. Treatment specificity in chronic low back pain: is optimized rehabilitation assignment enough? Rehabilitation 2004;43(3):142-151.

Figure 6

OSWESTRY-Disability Questionnaire

Total score

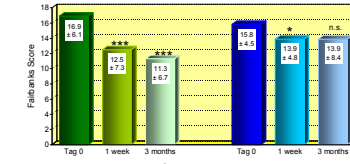


Figure 7

OSWESTRY-Disability Questionnaire

Section: PERSONAL CARE

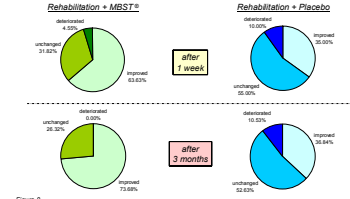


Figure 8

OSWESTRY-Disability Questionnaire

Section: LIFTING

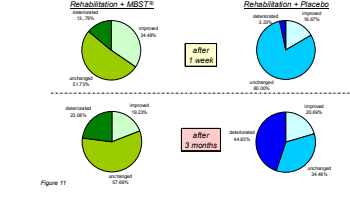


Figure 11

OSWESTRY-Disability Questionnaire

Section: SITTING

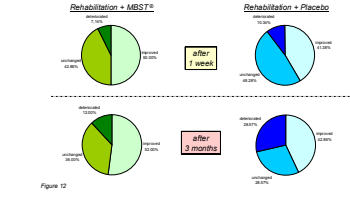


Figure 12

Results

The standardized multidisciplinary rehabilitation procedure significantly improved the Roland-Morris (RM) total score for low back pain for all patients during the three-week inpatient rehabilitation period (Figure 1). After three months, however, the RM score of the placebo patients had increased again. On the other hand, the MBST® patients showed a RM score that was still significantly better than the initial value. In several RM questions activities of daily living (bending, dressing, sitting, etc.) improved better in patients with additional MBST® (Figures 2 - 6).

The Oswestry score showed a similar result with significant improvements in both groups after 1 week therapy, further improving after 3 months MBST® (Figure 7). The positive changes in the section "personal care" are of great importance showing that more than 70 % of the in the MBST® group reported improvement and none of them (1) deterioration (Figure 8). The sections "walking, standing, lifting, and sitting" (Figures 9 - 12) also showed improvements as a result of the standardized therapy programme in both groups with slight advantages for MBST®. The results revealed good efficacy of the standardized rehabilitation programme.

The measurements of pain (VAS; Figure 13) showed that there was distinct relief during the inpatient rehabilitation period, independently of whether or not the patients had been subjected to MBST®-NuclearMagneticResonanceTherapy. This decrease of pain could still be observed three months later.

OSWESTRY-Disability Questionnaire

Section: WALKING

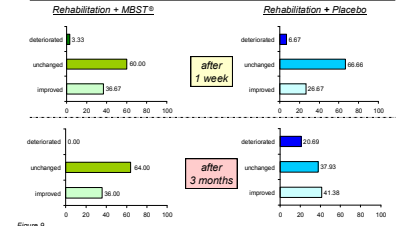


Figure 9

OSWESTRY-Disability Questionnaire

Section: STANDING

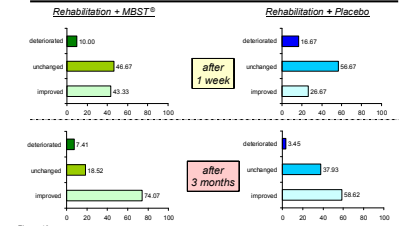


Figure 10

Conclusion

MBST®-NuclearMagneticResonanceTherapy is a novel, highly technical therapy procedure for which the effective mechanism has been derived directly from nuclear resonance tomography and cannot and should not be compared or confused with PEMF. The nuclear resonance field has a preselected cell biochemistry frequency which is basically amplitude modulated with a modulation frequency similar to the nuclear resonance frequency. The purpose is to obtain the highest possible actively directed resonance energy transfer using the smallest possible field strength.

The results of our study point out that significant improvements in functionality can be achieved with standard rehabilitation methods during inpatient rehabilitation, as measured with the help of the Roland-Morris questionnaire for low back pain, the Oswestry disability questionnaire and the VAS. For patients subjected to MBST® as part of the treatment, both of the disability scores showed a better outcome at the end of a three-month evaluation period compared to placebo.

As a general conclusion, we consider MBST®-NuclearMagneticResonanceTherapy to be an additional, complementary, therapeutic method that is easy to apply and that requires only very short therapeutic procedures. MBST® can positively enhance therapeutic success in the rehabilitation of patients suffering from low back pain, without side effects.