MBST – NUCLEAR MAGNETIC RESONANCE THERAPY
THE NEW POSSIBILITY OF OSTEOARTHRITIS
AND OSTEOPOROSIS TREATMENT

Dalibor Krpan

SUMMARY

The common approach to chronic bone and joint diseases does not give satisfactory results despite the introduction of several new drugs for osteoporosis and new materials and techniques used in orthopedics and physical therapy of osteoarthritis.

The main reason for that is a partial approach. Thus the treatment of osteoporosis is usually limited to the drug application, and the treatment of osteoarthritis to physical therapy or orthopedic therapy with the goal to temporally reduce the symptoms, mostly the pain. Clinical trials and scientific research confirmed that osteoporosis is result of decreased bone quality rather than decreased bone mass as it was thought before, and that bone quality depends on genetics, biochemical and metabolic balance as well as biomechanical stress. Therefore, to change the concept of the treatment of chronic bone and joint disease such as osteoporosis and osteoarthritis is necessarily. Since the quality of bone and cartilage largely depends on the bio-mechanical balance, any change in that balance will affect the whole skeleton. Because of that it is necessary to treat the entire skeleton based on individual assessment of each patient, which is best achieved using the "4e" method (education, exercise, evaluation, elective therapy). "4e" method is integral concept of treatment with combination of bio-mechanical treatment, medication, physical therapy and MBST, according to individual assessment of bone quality.

The important part of "4e" method is MBST, nuclear magnetic resonance therapy, which is the only method capable to initiate cartilage regeneration and bone formation by activating chondrocytes and osteoblasts.

INTRODUCTION

It is well known that the chronic bone and joint disease such as osteoporosis and osteoarthritis are among the most common diseases of our civilization. It is also well known that the problem of bone and joint disorders will further increase...
in the future. So, the most important question is: could we do something to change it? The fact is that the common approach to the osteoporosis and osteoarthritis does not give satisfactory results despite the introduction of several new drugs for osteoporosis and new materials and techniques used in orthopedics and physical therapy of osteoarthritis.

The main reason for that is a partial approach. Thus the treatment of osteoporosis is usually limited to the drug application, and the treatment of osteoarthritis to physical therapy or orthopedic therapy with the goal to temporally reduce the symptoms mostly the pain. Focus of treatment is only limited to part of skeleton, one that caused the pain, without considering the fact that the skeleton is indivisible organ and only by treating it as a whole we can get positive results. Furthermore, clinical experience showed that more then 50% of fractures on minimal trauma happened to the patients with normal BMD. It has been shown also that osteoporosis can be developed without hormonal or biochemical disturbance, such as happened in the case of astronauts. Clinical trials and scientific research confirmed that osteoporosis is result of decreased bone quality rather than decreased bone mass, as it was thought before, and that bone quality depends on genetics, biochemical and metabolic balance as well as biomechanical stress. Therefore, to change the concept of the treatment of chronic bone and joint disease such as osteoporosis and osteoarthritis is necessarily. Since the quality of bone and cartilage largely depends on the bio-mechanical balance, any change in that balance will affect the whole skeleton. For example osteoarthritis of the knee is not only knee disease, because it causes bio-mechanical imbalance leading to the pathological changes in other joints and bone structure as well. Because of that it is necessary to treat the entire skeleton based on individual assessment of each patient, which is best achieved using the "4e" method (education, exercise, evaluation, electrotherapy). "4e" method is integral concept of treatment with combination of bio-mechanical treatment, medication, physical therapy and MBST, according to individual assessment of bone quality.

The important part of "4e" method is MBST, nuclear magnetic resonance therapy, which is the only method capable to initiate cartilage regeneration and bone formation by activating chondrocytes and osteoblasts.

What is MBST (nuclear magnetic resonance therapy?)

The nuclear magnetic resonance therapy – MBST, has been well established over the last ten years as the conservative therapy for musculoskeletal disorders. It is using the physical phenomenon of the nuclear magnetic resonance, well known from the MRI, the most sophisticated diagnostic procedure. A therapeutic use of the nuclear magnetic resonance for osteoarthritis, sports and accident injuries, osteoporosis, and metabolic disorders of the bones is a reasonable alternative and supplement of today's existing therapeutic spectrums as there is a tremendous need for effective therapies for these medical problems. In particular, because
causal therapies are almost totally lacking and are not able to achieve effect as MBST can do. Additional advantage of this method is that it has shown no side effects so far and is considered as painless.

The development of MBST and therapy equipment, which is using the nuclear magnetic resonance for the treatment of musculoskeletal disorders such as arthritis, osteoporosis and sports injuries as well as accident injuries, was by coincidence. Patients with joint pains reported, initially unexplainable, after frequently used MRI examinations repeatedly about amelioration of their pains. Doctors, biologists and physicists finally came to the conclusion that it could be the phenomenon of the MRI causing this positive effect. In several years of work they developed therapy systems which use the same physical principle as the MRI units, the nuclear magnetic resonance imaging, but with much weaker electromagnetic fields and radio frequencies as the MRI technology. So, from a technological point of view, the nuclear magnetic resonance therapy has been derived from the MRI. Both use the same physical phenomenon. The therapy equipment from MBST is using field strengths from 0.4 to 2.35 MilliTesla for 17 to 100 kilo Hertz in the magnetic resonance frequency. The field strength varies depending on the treatment system. In an opinion of the Physikalischen Instituts der Universität Würzburg, Lehrstuhl für Experimentelle Physik 5, Prof. Dr. P. Jakob (2005), was irrevocable found that the therapy equipment MBST meet all scientific terms to create the conditions of nuclear magnetic resonance by the “fast adiabatic passage”. This is also an absolute unique selling proposition against the therapy systems with pulsating magnetic fields on the market, which therapeutically effective elements only a pulsating magnetic field represents. Three fields of different characteristics are necessary contrary to the production of nuclear magnetic resonance conditions:

1) Static main magnetic field
2) Variable sweep dB0/dt field parallel to the main magnetic field
3) Electromagnetic-changing field B1 (t) must be sufficient with the Larmor – condition and perpendicular to the other fields

These fields are presentable over a magnetic resonance detector and an oscilloscope and mark clearly the detectable therapeutic volume of MBST ® therapy devices. The over the radio frequency modulated treatment sequences agree with the body vibration frequencies so that a stimulation of cartilage and bone tissues takes place.

Numerous studies have been performed over the effectiveness of nuclear magnetic resonance therapy in prestigious universities and research institutes who meet the evidence criteria of medical sciences. All the studies clearly confirmed the regeneration of the cartilage and stimulation of bone formation, as well as significantly clinical improvement. One of the basic study, done in prestige scientific institutions in Germany, in Achen, Julich and Grunstadt, published in Medhodes
Find Exp Clin Pharmacol 27 (6) by A. A. Temiz-Artmann, P. Linder, P. Kayser, E. Digel, G.M. Artmann, and P. Lucker revealed that MBST treatment did not induce apoptosis or affect cell viability of human chondrocytes and osteoblast cultures, but showed an elevated cell proliferation rate quantified by cell count (1). It was proved also that MBST exposure stimulates production of the new collagen and decrease “old” cross linking collagen (1. Digel, E. Kurulgan, P. Linder, P. Kayser, D. Porst, G.J. Braem, K. Zerlin, G.M. Artmann, A. Temiz, Artmann: Decrease in extracellular collagen crosslinking after NMR magnetic field application in skin fibroblasts in Med Bio Eng Comput 45:91-97 2007). (2). The effect on the cartilage was proven on animal model as well as on the humans. A number of clinical studies confirmed a significant clinical improvement in the case of osteoarthritis and in the case of osteoporosis a significant increase of BMD in only six months after MBST treatment. (3-19)

**CONCLUSION**

Statistical analysis of number of clinical studies on patients with osteoarthritis on different joints treated with MBST - Nuclear Magnetic Resonance Therapy, after only one MBST cycle of 5 or 9 days shows:

- general improvement ranging from over 60% up to 80% and more
- pain reduction down to about 50% of the initial score
- constant decrease of pain intensity and frequency at different conditions
- All these improvements have been proved to get the maximum result at 8 weeks to 6 months after therapy but also lasting on a one year period.

Studies of osteoporosis treatment showed significant increase of BMD up to 35 %, T-score, up to 33,9 % and Z-score up to 72,46 %.

Based on the clinical experience, result of scientific and clinical trials as well as the cost and benefit analysis we would like to recommend, as the most rational use of MBST in the following conditions:

1. MBST program of 3 or 5 days once per year for all persons with increased risk of osteoarthritis or osteoporosis in combination with regular exercise.
2. MBST program of 5 or 9 days for all persons with osteoarthritis once per year together with exercise and pain relief therapy.
3. MBST program of 9 days twice a year in combination with physical therapy and sometimes with orthopedic therapy in the patients with severe osteoarthritis.
4. MBST program for osteoporosis 10 days in the case of osteopenia, increased risk of osteoporosis or in the case in which pharmacotherapy failed or has an increase risk of adverse affect.

*Key words*: MBST, Nuclear magnetic resonance therapy
REFERENCES


2. I. Diegel, E. Kuruglan, P. Linder, P. Kayser, D. Porst, G. J. Braem, K. Zerlin, G. M. Artmann, A. Temiz Artmann: Decrease in extracellular collagen crosslinking after NMR magnetic field application in skin fibroblasts; in: Journal of the International Federation for Medical and Biological Engineering, No. 1, January 2007, 45:91-97 (English)


6. W. Kullich, H. Schwann, K. Machreich, M. Ausserwinkler: Additional outcome improvement in the rehabilitation of chronic low back pain after nuclear resonance therapy; in Rheumatologia 1/2006, P. 7-12 (English)

7. Hg. Jack E. Jensen: The one Stop - Knee Shop; A complete guide to knee fitness, prevention and health maintenance strategies, and medical and surgical care options; Houston, USA 2007, S. 84-85 (English)

8. B. Auerbach, A. Yacoub, C. Melzer: Prospective study over a period of 1 year in respect to the effectiveness of the MBST® - Nuclear Magnetic Resonance Therapy as used during the conservative therapy of Gonarthrosis; Orthopädische Praxis, Taucha. Lecture, Poster Presentation at the 1st Collective Congress Orthopaedic - Accident Surgery, 19.-22. October 2005, Berlin. Published in: Congress Catalogue, Abstract, Poster R2-446 (Poster in English)


10. Treatment of Osteoporosis with Magnetic Resonance Therapy, Orthodoc, P. 1417 (English)

11. Nuclear spin technology for the treatment of Arthritis, Medical Tribune (German edition) 1-2, January Influence 2009, P. 9 (German)

13. Arthrosis and Pain Therapy with MRI; published in: business magazine for Orthopaedic specialists 6/2008, P. 12 (German)

14. Functional Improvement in Finger Joints Arthrosis by therapeutic use of magnetic resonance; Ludwig Boltzmann Cluster for Rheumatology, Balneology and Rehabilitation; and the LBI for Rehabilitation of internal diseases, Saalfelden and the Ludwig Boltzmann field office Alzehofen for Rheumatology and Balneology , published in: Orthopadische Praxis 44, 6/2008, P. 287-290 (English)

15. MBST® NMR: Innovation in the treatment of musculoskeletal disorders; published in: DOV-Magazin, Deutscher Orthopaden Verband e. V., edition May/June 2008, P. 4 - 6 (German)


