

# Functional improvement in finger arthritis following Magnetic Resonance Therapy

KULLICH W., AUSSERWINKLER M.

Ludwig Boltzmann Institute for Rheumatology, Balneology and Rehabilitation –  
Ludwig Boltzmann Institute for Internal Medicine and Rehabilitation, Saalfelden, Austria



## Introduction

Arthritis of the hand and fingers is one of the leading causes of disability when it comes to performing everyday activities. The main symptoms of finger arthritis in the early stages of the disease are tightness and stiffness, pain after engaging in a certain level of activity, an increase in pain in cold and damp weather, swelling and reddening of the joints, limited joint mobility, muscle tension due to the assumption of compensatory postures, loss of function. Since the pathogenic processes involved in arthritis of the hand and fingers are not fully understood to date, treatment is aimed at symptoms rather than causes, and may involve surgical intervention. This is why concepts offering new approaches to improving the pain and level of disability associated with hand and finger arthritis are of great interest. Based on the active principles used in magnetic resonance imaging diagnostic systems, it has now also become possible to use magnetic resonance for therapeutic purposes (MRT). MRT works by exposing hydrogen protons within cells to magnetic resonance, which causes them to undergo a functional and structural change. A recent investigation involving human fibroblasts has shown that Magnetic Resonance Therapy (MRT) affects collagen cross-linking and cartilage matrices (DIGEL et al., 2007).

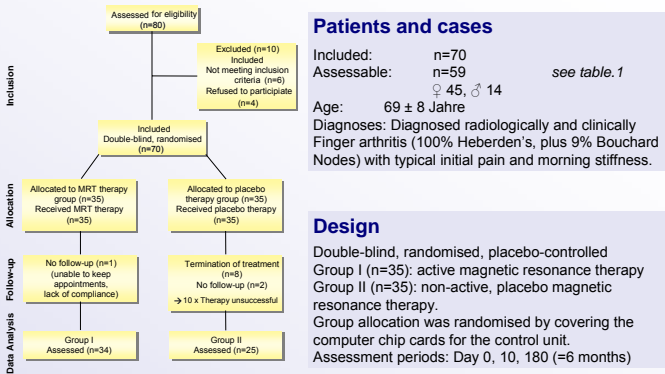


Table 1 CONSORT Flow-Chart

## Magnetic Resonance Therapy (MRT)

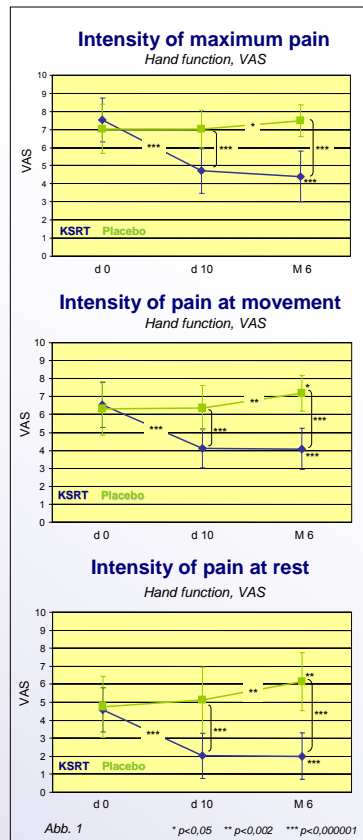
Treatment duration: 1 hour a day for 9 consecutive days  
 Therapy system: MBST® Magnetic Resonance Therapy System (KSRT-Key 1B, Type MBST 300 MRTS; Serial No. 10150316, manufactured by MedTec Medizintechnik GmbH., Wetzlar, Germany)  
 Dynamic magnetic field: Frequency approx. 100kHz

## Outcome measurement instruments

- Visual Analogue Scale (VAS) for rating maximum pain, pain at movement and at rest
- Frequency of pain
- 10-part Ordinal scale (0=no pain, 10=constant pain)
- Hand function and disability

Functional Scores according to QUABA et al. 1988, for the following criteria: 1) *Dressing* (putting on socks, buttoning up shirt), 2) *Personal care* (washing and combing hair; drying with a towel), 3) *Domestic chores* (using scissors; using a mechanical tin opener), 4) *Manual dexterity* (picking up individual coins from the bottom of a briefcase; holding a soft plastic cup filled with water; unlocking and locking a lock or door; writing with a pen)

- Score  
 4 Points: unimpaired ability to perform activity  
 3 Points: slightly impaired ability to perform activity  
 2 Points: significantly impaired ability to perform activity  
 1 Point: only able to perform activity when aided by other means  
 0 Points: unable to perform activity



## Results

Pain intensity was significantly reduced following magnetic resonance therapy, and maximum pain, pain at movement and pain at rest all improved as a result of MRT, but not under placebo (Figure 1).

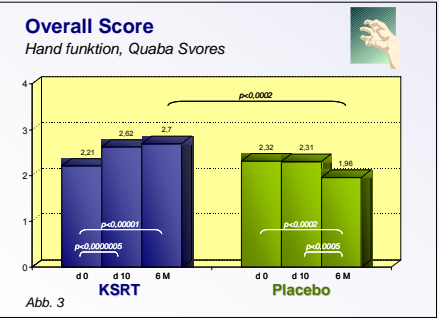
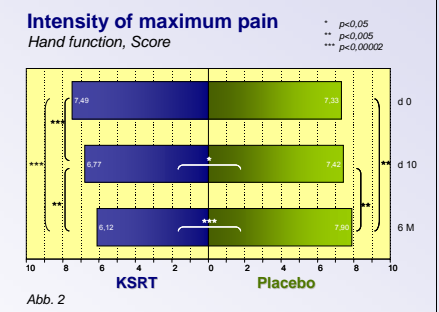
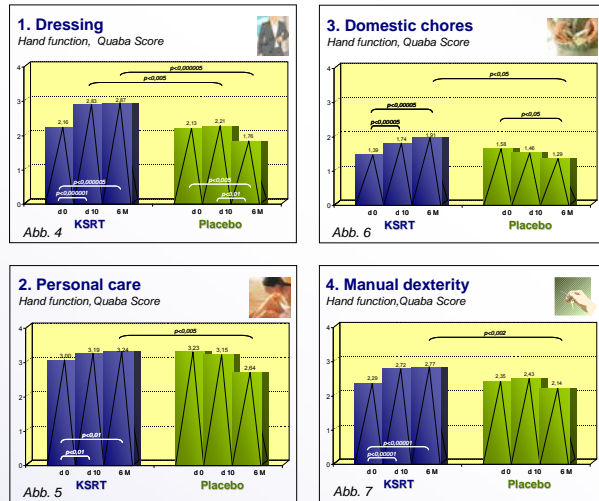
The frequency of pain was continuously and significantly reduced respectively while patients were undergoing magnetic resonance therapy and at follow-up 6 months later, while the control group receiving the placebo treatments experienced a gradual and, at follow up 6 months later, even significant increase in the frequency of pain (p < 0.005; figure 2).

Hand function was already greatly improved immediately following treatment by magnetic resonance as shown by the highly significant increase in the overall QUABA scores. This significant improvement continued beyond the 6-month follow-up (p < 0.00001; figure 3). The placebo group did not experience any improvements in hand function as measured by the QUABA Functional Scores immediately following their placebo treatment, and experienced a significant decline in hand function in comparison to the test group on day 0. After 6 months, the test group, having received magnetic resonance therapy, had a significantly higher QUABA score than the placebo group.

Patients from the active treatment group achieved similarly good results with respect to the QUABA scores' sub criteria such as dressing, washing, domestic chores and manual dexterity, while the placebo group's scores on these criteria dropped after six months (figure 4-7).

Neither of the treatment groups experienced any undesirable effects during treatment with the magnetic resonance therapy system. 10 patients from the placebo group dropped out of the study because of a lack of effect versus 1 patient in the test group who was excluded because of a lack of compliance.

## QUABA score sub-criteria



## Summary

Due to the limited treatment options currently available for hand and finger arthritis, it is vital that new therapeutic principles are investigated. Both in vitro and in vivo studies have shown that magnetic resonance has an effect on the regenerative processes acting in cartilage tissue and on pain signal transduction cascades, and that it effective in the treatment of arthritis. This study investigated the effect of magnetic resonance therapy (Magnetic Resonance Therapy; 9 x 1 hour) on 59 patients, between 53 to 69 years of age, suffering from arthritis of the hand and finger joints, using a double-blind, randomised and placebo-controlled design, over a period of 6 months. Patients receiving magnetic resonance therapy experience a significant improvement in hand function (QUABA Score) after 9 days of MRT and after 6 months, as well as an improvement in pain (intensity and frequency), while those in the placebo group experienced a deterioration in hand function and increase in pain over that same period of time. Magnetic resonance therapy is a new and effective treatment option for hand and finger arthritis. **Key words:** Magnetic resonance, hand/finger arthritis, pain, QUABA Hand Function Score