

## Scientific Evidence of Stem Cell Therapy in Orthopaedics

Pabinger C<sup>1</sup>, Kobinia G<sup>2</sup>

### Arthritis

Regarding arthritis, the first placebo controlled trial at the Mayo Clinic / USA revealed a significant improvement in all clinical scores at 6 months and shows, that stem cell therapy from bone marrow derived stem cells is safe and reliable.<sup>1</sup> In the year 2018 the „Use of stemcells for the restoration of cartilage and bone defects is therefore gold-standard“, according to the Medical University of Würzburg and lists the quantifiable effects and mechanisms of action as follows:<sup>2</sup>

- Improvement of pain and function
- Thickening of the cartilage (measurable in MRI)
- Improvement of the quality of the cartilage
- Increase of cartilage-specific collagen type II at 2 years

Another study showed an improvement of the degeneration in the MRI one year postoperatively (decrease of arthritis of 27%) and a quick and long lasting improvement of sport activities and activities of daily life (WOMAC, Lequesne, VAS) of approximately 78% - whereas conventional therapy showed improvement rates between 4-36% in a pilotstudy in the year 2013.<sup>3</sup> The 2-year results with 12 patients were comparable with improvement rates of 57-71% mean.<sup>4</sup>

### Bone marrow derived stem cells

In a review (1832 articles screened on stem cell therapy regarding cartilage repair) it was found, that bone marrow derived stem cells differentiate and act themselves via a cellular action on the one hand, but furthermore there is an even stronger “paracrin” effect as well, acting over cytokines which can be measured even 2 years postoperatively.<sup>5</sup>

Far tissue

### Fat tissue derived stem cells

Regarding the therapy with fat tissue derived stem cells a prospective study over 18 months showed a significant improvement in 4 clinical scores (pain from VAS 5±2 to 1±1, HSS knee score from 59±13 to 92±8, KSS Score from 42±15 auf 84±12, Tegner Lysholm score from 55±17 to 9±8) and no deterioration in the x-ray regarding IKDC grading and an improvement in the MRI (decrease of cysts and bone marrow edema).<sup>6</sup>

In the year 2016 the General Hospital Vienna and the department leader of the University Clinic of Orthopaedics published a review article in the largest German scientific paper, describing the positive and regenerative effects of the stem cell therapy.<sup>7</sup>

### Allogenic bone marrow stem cell transplantation

In a prospective controlstudy the allogenic bone marrow stem cell transplantation showed a significant improvement in 4 clinical scores as compared to hyaluronic acid and an improvement in the MRI regarding collagen type II and less cartilage lesions.<sup>8</sup>

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**NEUROLOGIE**  
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Amyotrophe Lateralsklerose

**DOZ. DR. MED. CHRISTOF PABINGER**  
Facharzt für Orthopädie und  
Orthopädische Chirurgie

**ÖÄK - DIPLOME:**  
Sportmedizin  
Alpin- und Höhenmedizin  
Chirotherapie  
Psychosomatik  
Komplementäre Medizin -  
Akupunktur  
Krankenhaushygiene  
Notfallmedizin  
Klinischer Prüfartz

**LEHRENDER:**  
Medizinische Universität Innsbruck  
FH Joanneum Graz

**DOZ. DR. MED. GEORG KOBINIA**  
Facharzt für Chirurgie  
Facharzt für Gefäßchirurgie  
Facharzt für Herzchirurgie  
Facharzt für Thoraxchirurgie

Präsident der Österreichischen  
Gesellschaft für Regenerative Medizin

Gründer und langjähriger Leiter  
Abteilung für Herz-Thorax Chirurgie  
am Klinikum Klagenfurt

**IRM GRAZ\***  
Plüddemanngasse 45  
A-8010 Graz  
T +43 316 90 82 04 11  
F +43 316 90 82 04 20

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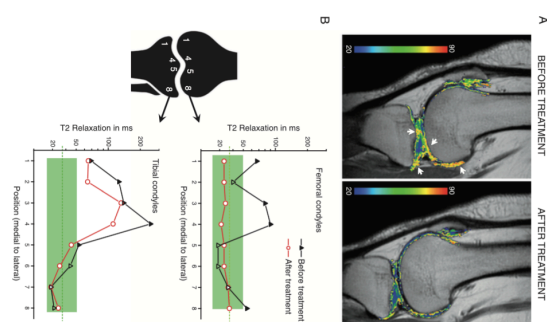
<sup>1</sup> Doz.Dr.med.Christof Pabinger, [www.irm.clinic](http://www.irm.clinic), Institut für Regenerative Medicine, Plüddemanngasse 45, 8010 Graz, Austria / EU

<sup>2</sup> Doz.Dr.med.Georg Kobinia, [www.regmedaustria.org](http://www.regmedaustria.org) Austrian Society for Regenerative Medicine, Wollzeile 3, 1010 Vienna, Austria / EU

## femoral head necrosis

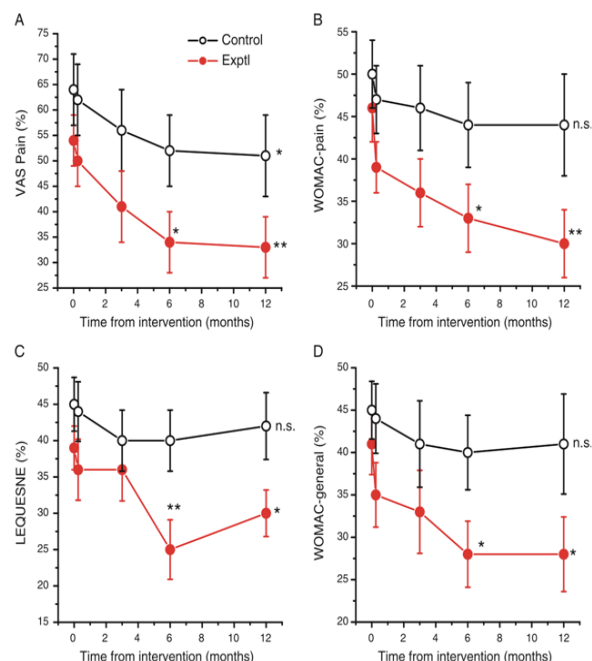
Regarding the treatment of femoral head necrosis, adding stem cells shows superior results as compared to core decompression alone, which is reflected in the 2-year femoral head survival rate of 88% in the stem cell group and 38% in control, respectively.

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## Improvement of the quality of the cartilage pre- and postoperatively in MRI

Vega A et al, *Transplantation.* 2015; 99(8): 1681-90.

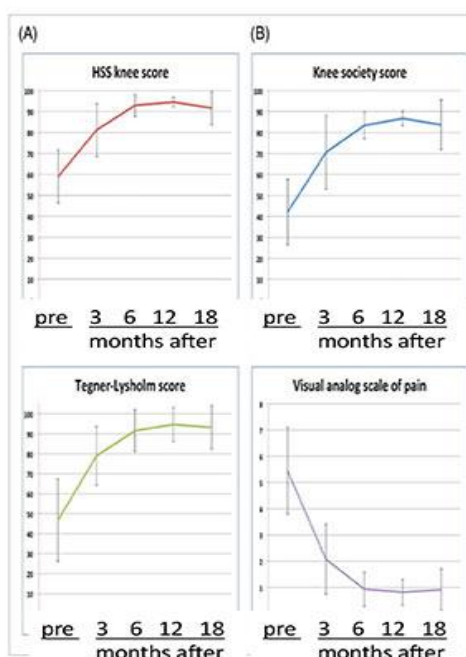


## Improvement of pain and Function as compared to conventional therapy

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