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## INTRODUCTION

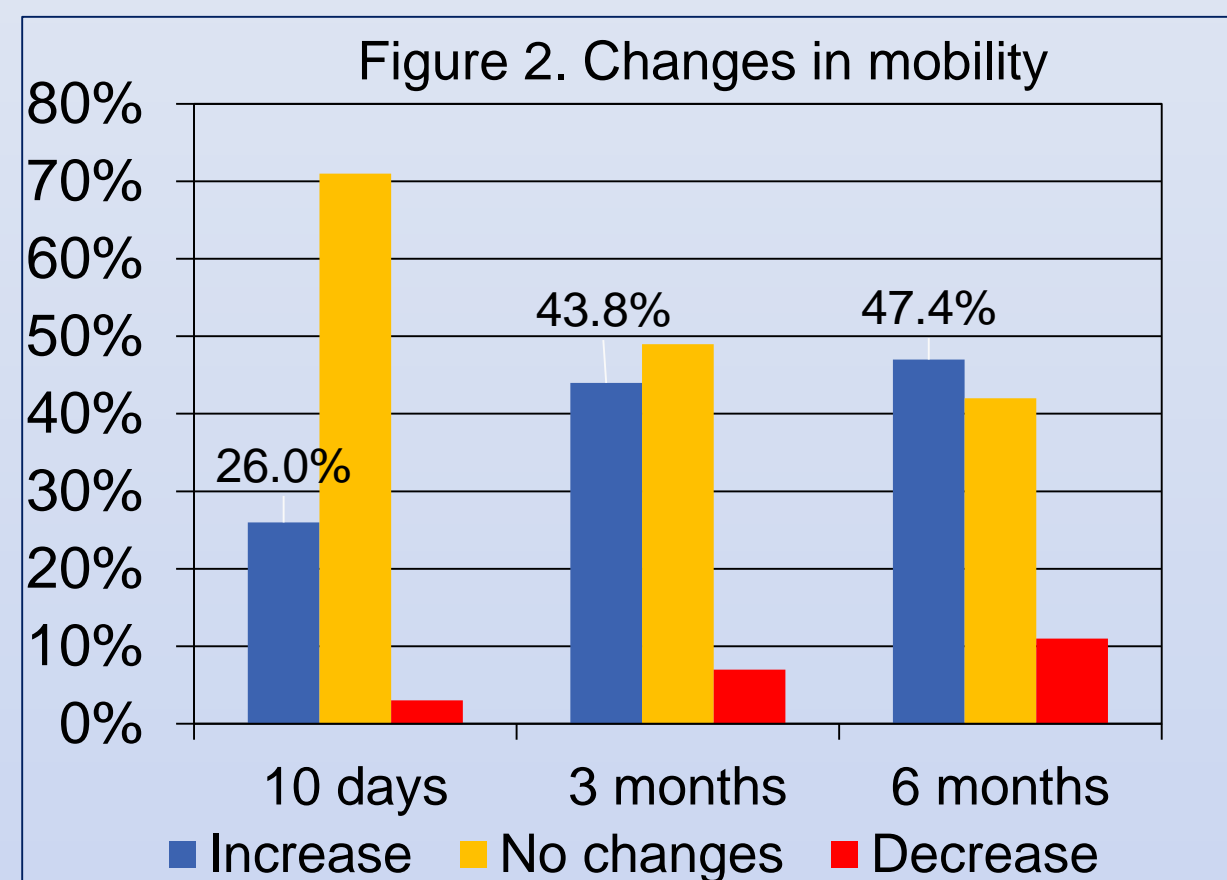
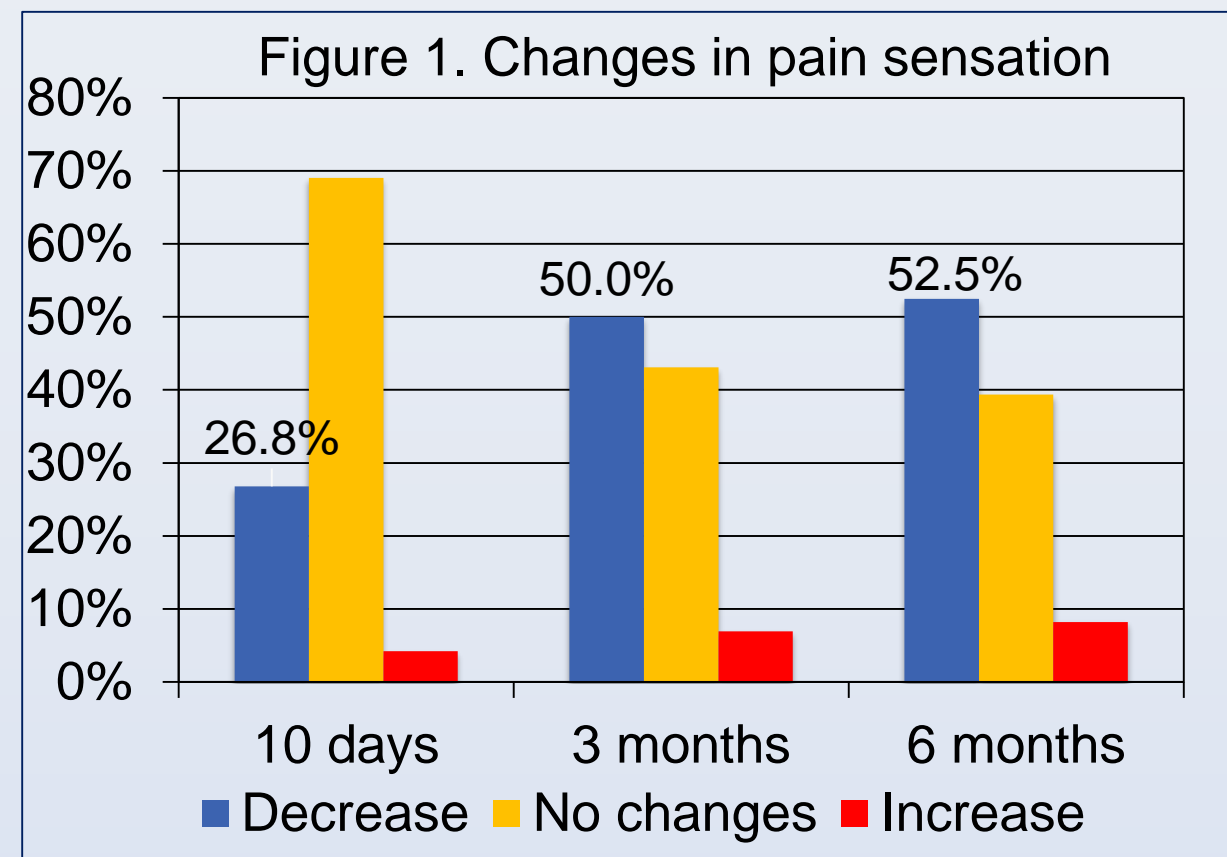
Pain reduction and mobility improvement are the main outcomes to determine the therapy efficacy of subjects with musculoskeletal disorders [1-2]. Stromal vascular fraction of adipose tissue contains mesenchymal stem cells (MSCs) that have the capacity to differentiate into cartilage, bone, muscle, and adipose tissue. MSCs have been proposed as an optimal regenerative cellular therapeutic for musculoskeletal conditions like osteoarthritis and rheumatoid arthritis [3]. In the current retrospective study we analyzed changes in pain and mobility of research subjects with osteoarthritis and rheumatoid arthritis after adipose tissue-derived stem cell (ADSC) therapy.

## METHODS

In the period from 2015 to 2016, 207 subjects underwent the therapy with their own stromal vascular fraction cells at the Malacky Hospital (Bratislava, Slovakia). Affected areas included knee and hip joints (right and left) with arthritis stage I-IV (1-minor, 4-severe). This retrospective study was approved by Institutional Review Board of the Institute of Regenerative and Cellular Medicine (IRCM-2017-137). The chart records are located at the Malacky Hospital and Mehling Orthopedics (Hackensack, NJ). Charts were reviewed and information regarding subjects' pain and mobility and magnetic resonance imaging (MRI) results were collected into the data collection form.

## RESULTS

Statistically significant decrease in subjects' pain sensation and improvement of subjects' mobility were observed three and six months after ADSC therapy (Figures 1 and 2).



Analysis indicated that the therapy was most effective in subjects with arthritis stage III (Table 1).

Table 1. Change in clinical status in regard to arthritis stage	Arthritis stages (% of subjects)		
	I, I-II, II, II-III	III	III-IV, IV
Decrease in pain	45.3%	68.2%	40.0%
Improved mobility	40.7%	63.2%	30.0%

## RESULTS CONT.

Below are MRI results of two subjects before and after therapy.

Case 1 (Figures 3 and 4). Initial MRI examination of hip (65-year-old woman) showed right coxartrosis gr. III., chondropathies gr. III-IV, mild edema and bone overgrowth of intra-articular fluid; left chondropathies gr. II-III, coxartrosis gr. II. Six months after application of stem cells, MRI examination showed slight bilateral improvement in both hip joints, partial regression of edema and synovial fluid of right cartilage and bone.

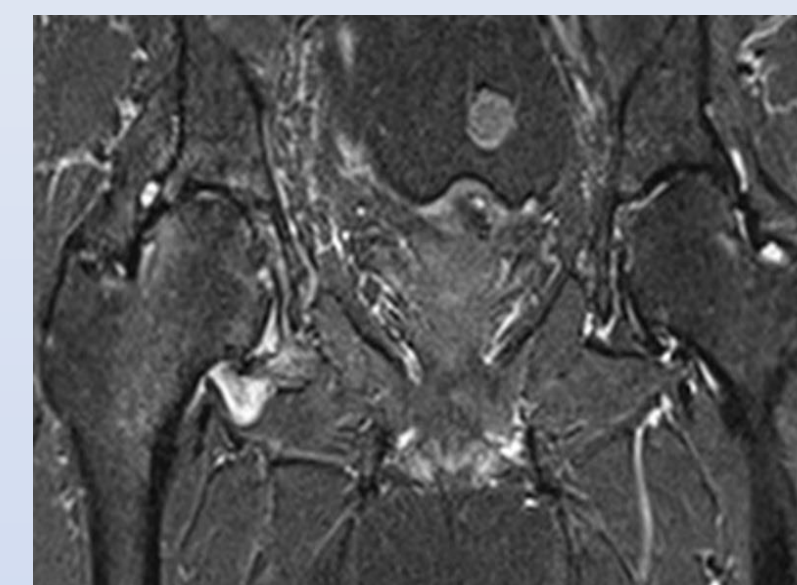


Figure 3.  
Pre Therapy MRI

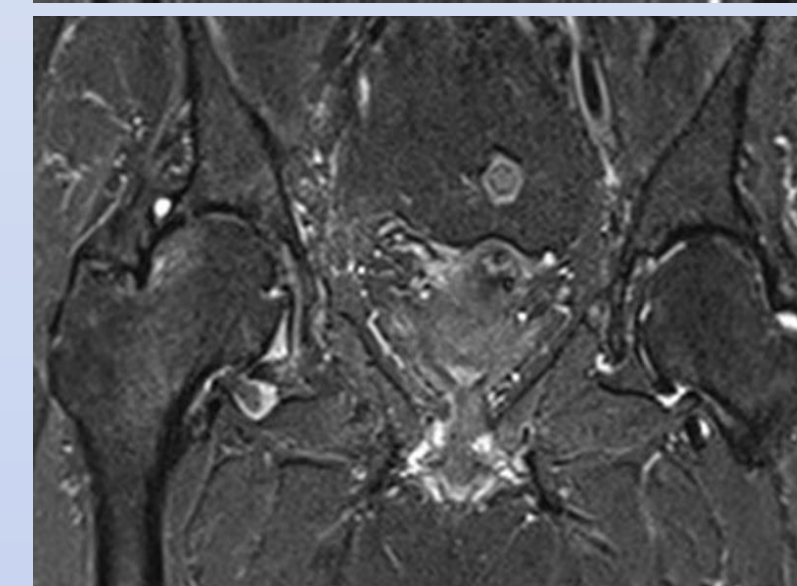


Figure 4.  
Post Therapy MRI

Case 2 (Figures 5 and 6). Initial MRI examination of left knee (58-year-old man) showed transversal cuts significantly polymerous fluid FP, chondromalacia patella gr. IV. Subchondral edema with small-scale media facet. Six months after application of stem cells, MRI examination showed significant regression of intra-articular fluid, regression of edema.

## RESULTS CONT.

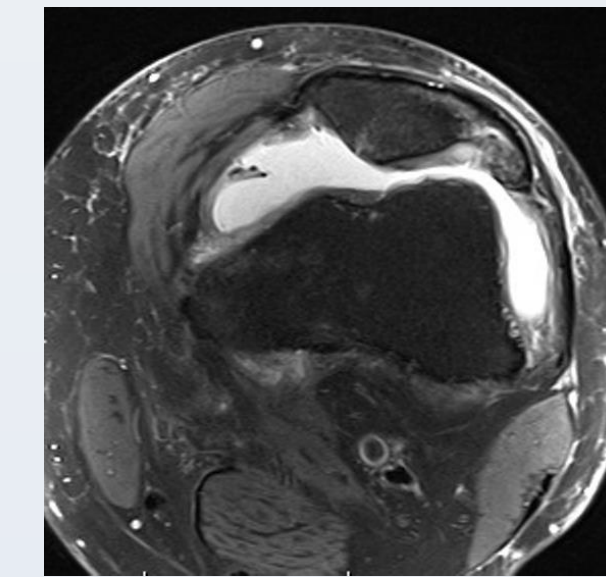


Figure 5.  
Pre Therapy MRI

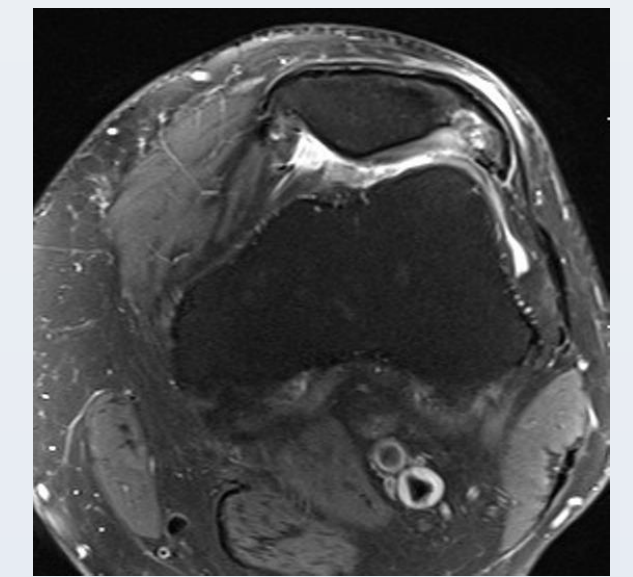


Figure 6.  
Post Therapy MRI

## CONCLUSION

Retrospective chart review study showed that intra-articular injection of ADSCs was effective in the improvement of some symptoms related to musculoskeletal conditions. Significant decrease in pain sensation and mobility improvement were observed six months after ADSC therapy. Due to the retrospective nature of the study, we were not able to follow-up with these research subjects and monitor long-term changes in symptoms related to musculoskeletal conditions. In order to further analyze the safety and efficacy of ADSC therapy, further retrospective and prospective studies are warranted.

## REFERENCES

1. Labusca L, Zugun-Eloae F, Mashayekhi K: Stem cells for the treatment of musculoskeletal pain. *World J Stem Cells* 2015; 7(1): 96-105.
2. Nathaniel P Katz, Florence C Paillard and Evan Ekman: Determining the clinical importance of treatment benefits for interventions for painful orthopedic conditions. *Journal of Orthopaedic Surgery and Research* 2015; 10:24.
3. Zuk PA, Zhu M, Ashjian P, De Ugarte DA, Huang JJ, Mizuno H, Alfonso ZC, Fraser JK, Benhaim P, Hedrick MH. Human adipose tissue is a source of multipotent stem cells. *Mol Biol Cell*. 2002 Dec;13(12):4279-95.