scale. The follow up (FUP) was 5 years. Individual patients' files described 90 parameters. Instrumental diagnostic methods included plain radiography of knee joints, dual energy X-ray absorptiometry (DEXA) of lumbar spine L1–4, femoral neck and subchondral tibia, ultrasound (US) and MRI examination of knee joints. OA progression was verified based on evolution of radiological stage. At baseline 24 pts (7%) had stage I OA, 227 (66%) – stage II, and 93 (27%) – stage III. Discriminant analysis was applied to verify most reliable RF predicting radiological progression.

Results: Radiological progression was documented in 45% participants during 5 year FUP. The groups with and without progression were comparable in terms of age and disease duration ($p < 0.05$). Pts who progressed suffered more intensive knee pain – 68(52–72) vs 41(30–63) mm, $p < 0.01$, had higher body weight – 82(77–93) vs 72(65–81) kg, $p < 0.01$, had higher rates of knee synovitis (US) 44% vs 26%, $p = 0.03$, (RR=1.67, 95% CI 1.07–2.59) and mid-tibia bone marrow oedema – 60% vs 28%, $p < 0.01$ (RR=2.12, 95% CI 1.34–3.35). The discriminant analysis showed that knee pain, excessive body weight, synovitis and mid-tibia bone marrow oedema (MRI) can be considered as predictors of OA radiological progression. A model capable of predicting OA course in an individual patient with high 88% accuracy, 87.7% sensitivity and 70% specificity has been developed based on identified RF and their coefficients. Area under the ROC-curve 0, 921 (95% CI 0,875–0,966).

Conclusions: Knee pain, excessive body weight, synovitis and bone marrow oedema should be considered as key RF predicting knee OA radiological progression.

Disclosure of Interest: None declared

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FRI0546 **RELATIVE EFFICACY OF DIFFERENT EXERCISES IN KNEE AND HIP OSTEOARTHRITIS**

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Background: All osteoarthritis (OA) guidelines recommend exercise as one of the core treatments for OA.¹ However, it is unclear whether one exercise is better than another and for which outcome. Due to the limited evidence that compare different types of exercise, we undertook this network meta-analysis (NMA).

Objectives: To determine the relative efficacy of different exercises for pain and self-reported function at (or nearest to) eight weeks.

Methods: Nine electronic databases were searched for eligible randomised controlled trials (RCTs) that compared any types of exercise. The search was first performed in December 2015 and was updated in December 2017. Studies comparing exercise with usual care or with another exercise were included for this NMA. Common comparators such as usual care were used to network different types of exercise. Frequentist NMA was used to estimate the relative effect size (ES), i.e. standard mean difference and its 95% confidence interval (CI).²

Results: 217 RCTs (n=20419) met the inclusion criteria. Of these, 89 trials (n=7070; 97 comparisons) were analysed for pain outcome (figure 1), whilst 87 trials (n=7039; 97 comparisons) were analysed for function. Mind-body exercise was the most effective for pain relief, closely followed by aerobic exercise (See the last column, table 1). While mind-body remained the best for improving function, strength and flexibility/skills exercise were better than aerobic exercise (See the last row, table 1). Single exercises were consistently better than mixed exercise.

Table 1 Effect size (95% confidence interval) between different exercises

Pain outcomes:

Mind-body	0.05 (-0.49, 0.60)	0.42 (-0.04, 0.87)	0.51 (0.01, 1.02)	0.66 (0.23, 1.09)	1.07 (0.65, 1.49)
0.23 (-0.37, 0.84)	Aerobic	0.36 (-0.02, 0.75)	0.46 (0.0–0.91)	0.61 (0.23–0.98)	1.02 (0.65–1.39)
0.1 (-0.40, 0.60)	-0.13 (-0.57, 0.31)	Strength	0.09 (-0.22, 0.4)	0.24 (-0.02, 0.50)	0.65 (0.44–0.86)
0.16 (-0.40, 0.72)	-0.07 (-0.58, 0.43)	0.06 (-0.28, 0.40)	Flex/Skills	0.15 (-0.17, 0.47)	0.56 (0.25–0.87)
0.4 (-0.08, 0.87)	0.17 (-0.25, 0.58)	0.3 (0.01–0.59)	0.24 (-0.10, 0.58)	Mixed exercise	0.41 (0.23–0.59)
0.78 (0.32–1.25)	0.55 (0.14–0.96)	0.68 (0.45–0.92)	0.62 (0.28–0.96)	0.38 (0.17–0.60)	Usual Care

Functional outcomes:

Note: Exercises are in order from the top left to the bottom right. Pain outcomes are at the top and functional outcomes are at the bottom. Numbers in each cell represent effect size (95% confidence interval) between higher comparator versus lower comparator.

Abstract FRI0546 – Figure 1. Network diagram for pain

Aerobic: walking, cycling; FlexSkills: flexibility exercise, neuromotor training, proprioceptive training; Strength: resistance training; Mind-body: Tai-chi, Yoga; Mixed Ex: multi-component exercises

Conclusions: This exercise hierarchy and their relative efficacy provide a useful basis for patients and clinicians to select the most appropriate exercise whilst taking treatment goals (pain relief or functional improvement) and patient preference into consideration. The reason for the relative poor efficacy of mixed exercise warrants investigation as it contradicts current guidelines.

REFERENCES:

- [1] Fernandes L, et al. *EULAR recommendations for the non-pharmacological core management of hip and knee osteoarthritis*. Annals of the Rheumatic Diseases 2013;72(7):1125–1135.
- [2] Caldwell DM. *An overview of conducting systematic reviews with network meta-analysis*. Systematic Reviews 2014;3(109):1–4.

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FRI0547 **IN HAND OSTEOARTHRITIS, DECREASE IN SYNOVITIS RESULTS IN LESS JOINT PAIN; A LONGITUDINAL MAGNETIC RESONANCEIMAGING STUDY**

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Background: Current treatment options to alleviate pain in hand osteoarthritis (OA) are limited in number, efficacy, and safety. Local inflammation and subchondral bone activity are interesting as potential treatment targets, since synovitis and bone marrow lesions (BMLs) have the ability to change over time and were shown to have positive cross-sectional associations with joint tenderness.

Objectives: To investigate the longitudinal associations between features on magnetic resonance (MR) imaging and joint tenderness in patients with primary hand OA over two years.

Methods: Eighty-five consecutively included patients (81.2% women, mean age 59.2 years) with primary hand OA (89.4% fulfilling ACR classification criteria) from a rheumatology outpatient clinic received contrast-enhanced MR imaging (1.5T) and physical examination of the right hand interphalangeal joints of digits 2–5 at baseline and at follow-up two years later. MR images were scored paired in unknown time order, following the Hand OA MRI scoring system: synovitis, BMLs, and osteophytes on a 0–3 scale (higher score reflects worse condition), with half-point increments allowed for synovitis and BMLs delta-scores. Joint tenderness upon palpation was assessed by trained research nurses on a 0–3 ordinal scale. We tested the associations between decreased MR features and decreased tenderness by calculating odds ratios on joint level (n=680), using generalised estimating equations to account for the within patient effects. Additional adjustments were made for change in MR-defined osteophytes, synovitis, and BMLs, when appropriate. Similarly, we tested the associations between increased MR features and increased tenderness, and we explored interactions between the different MR features by stratifying for one another.

Results: Decrease in synovitis was seen in 90 joints and decrease in BMLs in 56, however when restricted to the 116 joints with baseline tenderness, at follow-up: 76 had reduced tenderness, 21 decreased synovitis, and 13 decreased BMLs. A decrease in synovitis, but not in BMLs, was associated with attenuated tenderness (table 1). Of 678 joints without maximum baseline tenderness, at follow-up: 115 had increased tenderness, 132 increased synovitis, 96 increased BMLs, and 44 increased osteophytes. An increase in synovitis, osteophytes, and, to a lesser extent, BMLs, was associated with increased tenderness (table 2). Through stratification it became apparent that BMLs were merely an effect modifier of the synovitis-tenderness association.

Table 1 The associations between decreased MRI features and decreased joint tenderness (in joints with tenderness and MRI feature present at baseline)

	N/total (%) joints with decreased tenderness	Adjusted analyses ^a OR (95% CI)	Adjusted analyses ^b OR (95% CI)
Synovitis			
Stable/increase	30/58 (51.7)	1.0 (reference)	1.0 (reference)
Decrease	17/21 (81.0)	3.99 (0.95 – 16.76)	5.88 (1.12 – 30.95)
Bone marrow lesions			
Stable/increase	23/39 (59.0)	1.0 (reference)	n.a.
Decrease (≥0.5)	6/13 (46.2)	0.39 (0.10 – 1.50)	n.a.
Decrease (≥1)	5/11 (45.5)	0.53 (0.14 – 1.95)	n.a.

OR=Odds ratio; CI=confidence interval; ^aAdjusted for patient effect; ^bAdjusted for patient effect, increase of MRI-defined osteophytes, and decrease of BML/synovitis.

Table 2 The associations between increased MRI features and increased joint tenderness (in joints without maximum tenderness at baseline)

	N/total (%) joints with increased tenderness	Adjusted analyses ^a OR (95% CI)	Adjusted analyses ^b OR (95% CI)
Synovitis			
Stable/decrease	78/536 (14.6)	1.0 (reference)	1.0 (reference)
Increase	36/132 (27.3)	1.80 (1.11 – 2.91)	1.81 (1.11 – 2.94)
Bone marrow lesions			
Stable/decrease	94/569 (16.5)	1.0 (reference)	1.0 (reference)
Increase (≥0.5)	17/96 (17.7)	1.40 (0.99 – 1.97)	1.14 (0.81 – 1.60)
Increase (≥1)	11/51 (21.6)	1.66 (0.99 – 2.78)	1.33 (0.82 – 2.17)
Osteophytes			
Stable	102/632 (16.1)	1.0 (reference)	1.0 (reference)
Increase	13/44 (29.5)	2.58 (1.53 – 4.38)	2.75 (1.59 – 4.77)

OR=Odds ratio; CI=confidence interval; ^aAdjusted for patient effect; ^bAdjusted for patient effect and increase of MRI-defined synovitis/BML/osteophytes.

Conclusions: In hand OA, a decrease in MR-defined synovitis is associated with a decrease in joint tenderness. Furthermore, an increase in synovitis or osteophytes is associated with increased tenderness, which is further augmented by co-occurrence of BMLs. These findings support targeting synovitis in hand OA.

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FRI0548 ASSOCIATION OF OMERACT CORE DOMAINS OF PAIN AND FUNCTION WITH PATIENT SATISFACTION AFTER TOTAL JOINT REPLACEMENT

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Background: Up to 20% of Total Joint Replacement (TJR) patients are dissatisfied, but this is difficult to study as it is challenging to pool data due to the lack of unified core outcome measures. The OMERACT TJR Special Interest Group has

recently endorsed a core domain set that include pain and function, and now seeks validation prior to development of a TJR trial core measurement set.

Objectives: To assess the association of pain relief and improved function with patient satisfaction 2 years after TJR.

Methods: We identified all patients undergoing total hip (THR) and knee (TKR) replacement in a hospital-based registry from 2007–2011, and evaluated those with 2 year satisfaction scores. Pain and function were measured using the Knee and Hip injury and Osteoarthritis Outcome Score (KOOS, HOOS) and satisfaction was measured using 5 primary questions, each rated on a Likert scale. Each question was weighted equally and a satisfaction summary score was calculated (range 0–100, higher scores corresponding to greater satisfaction). Expectations were measured using the validated HSS Expectations survey. Correlation was analysed with Spearman coefficients, and scores were compared by quartiles using the Kruskal-Wallis test.

Results: We included 4796 primary unilateral TKR and 4801 THR. 78% of TKR and 90.7% of THR were very satisfied with pain relief, and 6.5% of TKR and 2.5% of THR were somewhat or very dissatisfied (table 1). Satisfaction correlated moderately with pain (TKR $\rho=0.61$, THR $\rho=0.47$) and function (TKR $\rho=0.65$, THR $\rho=0.51$) at 2 years; there was no correlation with baseline expectations. When comparing satisfaction by pain, function and expectation quartiles, there were statistically significant differences (table 2); those with the best scores and greatest change in pain and function were the most satisfied.

Abstract FRI0548 – Table 1. Satisfaction Questions and Distribution

Satisfaction Questions and Distribution	n (%) 4,796 TKR	n (%) 5,294 THR
Pain relief		
Very satisfied	3754 (83.3)	4801 (90.7)
Somewhat satisfied	623 (13.0)	303 (5.7)
Neither satisfied nor dissatisfied	108 (2.3)	61 (1.2)
Somewhat dissatisfied	168 (3.5)	62 (1.2)
Very dissatisfied	143 (3.0)	67 (1.3)
Improving ability to do housework or yard work		
Very satisfied	3214 (67.0)	4361 (82.4)
Somewhat satisfied	918 (19.1)	1385 (26.1)
Neither satisfied nor dissatisfied	301 (6.3)	169 (3.2)
Somewhat dissatisfied	217 (4.5)	102 (1.9)
Very dissatisfied	146 (3.0)	77 (1.5)
Improving ability to do recreational activities		
Very satisfied	2714 (57.8)	3981 (75.2)
Somewhat satisfied	1177 (24.5)	1810 (34.3)
Neither satisfied nor dissatisfied	358 (7.4)	234 (4.4)
Somewhat dissatisfied	273 (5.7)	155 (2.9)
Very dissatisfied	216 (4.5)	114 (2.2)
Overall satisfaction with surgery results		
Very satisfied	3581 (74.7)	4593 (86.8)
Somewhat satisfied	721 (15.0)	462 (8.7)
Neither satisfied nor dissatisfied	100 (2.1)	56 (1.1)
Somewhat dissatisfied	208 (4.3)	94 (1.8)
Very dissatisfied	188 (3.9)	89 (1.7)
Improved quality of life		
More than ever dreamed possible	956 (19.9)	1581 (29.9)
Great improvement	2722 (56.8)	3128 (59.1)
Moderate improvement	704 (14.7)	400 (7.6)
A little improvement	204 (4.3)	91 (1.7)
No improvement at all	104 (2.2)	55 (1.0)
Quality of life is worse	108 (2.2)	39 (0.7)

Abstract FRI0548 – Table 2. Association between outcomes and Satisfaction

Association between outcomes and Satisfaction	TKR Satisfaction score median [IQR]	p-value	THR Satisfaction score median [IQR]	p-value
2-year pain		<0.001		<0.001
Q1	72 (43, 86)		N/A	
Q2	91 (81, 96)		84.5 (67, 96)	
Q3	96 (91, 96)		96 (91, 96)	
Q4	96 (96, 100)		96 (96, 100)	
2-year function		<0.001		<0.001
Q1	77 (47, 90)		96 (81, 96)	
Q2	91 (77, 96)		96 (91, 96)	
Q3	96 (96, 96)		96 (96, 100)	
Q4	96 (91, 100)		96 (96, 100)	
3 function		<0.001		<0.001
Q1	81 (49, 96)		96 (77, 96)	
Q2	92 (81, 96)		96 (91, 96)	
Q3	96 (86, 96)		96 (96, 100)	
Q4	96 (96, 100)		96 (96, 100)	
Baseline expectations		<0.001		<0.001
Q1	91 (76, 96)		96 (86, 96)	
Q2	96 (81, 96)		96 (91, 96)	
Q3	96 (82, 96)		96 (91, 100)	
Q4	96 (86, 96)		96 (96, 100)	

Scores are summarised as median [interquartile range] and compared using the Kruskal-Wallis test. *The median 2-year pain score for THR was 100, so the third and fourth quartiles are the same. Quartiles differ for THR and TKR.

Scores are summarised as median [interquartile range] and compared using the Kruskal-Wallis test. *The median 2 year pain score for THR was 100, so the third and fourth quartiles are the same; Quartiles differ from THR and TKR

Conclusions: These findings confirm that with increasing relief of pain and functional improvement, the strength of the association of 2 core domains with satisfaction increases, further validating these core domains for use in TJR clinical trials. A core outcome measurement set needs to be defined for use in TJR clinical trials that includes validated measures of these domains.

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