were defined. Among these proteins, vascular cell adhesion molecule-1 (VCAM1) was found increased in HOA compared to RA and PSA groups.

Conclusions: A specific protein profile for the characterisation of EHOA and NHOA disorders has been established. VAS showed elevated levels in patients with NHOA, whereas ECM1 was increased in patients diagnosed with the erosive form of the disease. As none of them were identity in the other phenotype, they might be phenotype-specific biomarkers. In addition, VCAM1 was found with higher levels in both phenotypes of HOA when compared with RA and PSA and might be used to differentiate hand osteoarthritis from other rheumatic diseases.

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Disclosure of Interest: None declared

**FR0521 COMBINING FRACTAL- AND ENTROPY-BASED BONE TEXTURE ANALYSIS FOR THE PREDICTION OF OSTEARTHRITIS: DATA FROM THE MULTICENTER OSTEARTHRITIS STUDY (MOST)**


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**Background:** Osteoarthritis (OA) is one of the leading causes of long-term pain and disabilities associated with musculoskeletal disorders. Effective treatment and disease-progression slowdown depend on early detection and quantification of risk. However, current disease parameters, like joint space width (JSW), have proven to be insufficient for the prediction of OA.

**Objectives:** The purpose of the present study was to investigate if combining fractal- and entropy-based bone texture analyses with joint space width (JSW) and joint space area (JSA) may improve prediction of OA. Conventional posterior-anterior (PA) knee radiographs of men and women were obtained from the Multicenter Osteoarthritis Study (MOST) database, which provides valuable information to identify and define modifiable biomechanical, bone and structural, nutritional, and other risk factors for new disease and progression of existing disease.

**Methods:** Oriented fractal- and entropy based texture algorithms were developed, using state-of-the-art computer hardware and software as well as specific machine-learning algorithms. The selected subchondral area used for textural analyses included 4 regions of interest (ROI) in the proximal tibia and one on each condyle of the distal femur (figure 1). Furthermore, JSW and JSA were assessed using newly developed and fully automated software.

**Results:** 1092 conventional knee radiographs obtained from one study centre one were screened for eligibility. Of these, a total of 574 radiographs (230 women, 344 men) meet the inclusion criteria, i.e. a Kellgren & Lawrence (KL) score of 0 at baseline. At month 84, 41 female and 79 male patients had developed KL > 1, and 189 female and 265 male patients remained at KL0. Area-Under-the-Curve (AUC) for incident OA using JSW/JSA and clinical features were 0.67±0.08 for women, and 0.61±0.1 for men. In contrast, combining fractal/entropy-based texture, JSWA and clinical features resulted in significantly improved AUC for women and men (0.80±0.07 for women and 0.69±0.1 for men, respectively). To test whether these differences in predicting incident OA were significant, we performed classifier comparison: t=3.84; p<0.001 for women, and t=3.38; p<0.001 for men.

**Conclusions:** This study provides strong evidence, that a combination of fractal- and entropy-based textural analyses of plain subchondral bone radiographs together with JSWA and clinical features is superior to JSWA and clinical features alone in predicting incident OA in men and women.

**REFERENCE:**

**FR0522 VITAMIN D SUPPLEMENTATION IMPROVES DEPRESSION IN KNEE OSTEOARTHRITIS PATIENTS OVER 24 MONTHS**

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**Background:** Although depression is prevalent in osteoarthritis (OA) patients and the positive association between vitamin D deficiency and depression has been demonstrated, no study has examined the effect of vitamin D supplementation on depression in OA patients.

**Objectives:** To determine the effect of vitamin D supplementation and maintaining sufficient serum vitamin D on depression in patients with knee OA and vitamin D deficiency.

**Methods:** Participants with symptomatic knee OA and vitamin D deficiency were enrolled in a randomised, placebo-controlled trial and received 50,000IU vitamin D3 (n=209) or placebo (n=204) monthly for 24 months. Serum 25-hydroxyvitamin D [25(OH)D] was measured at baseline, month 3 and 24. Depression was measured using the patient health questionnaire (PHQ-9), and knee symptoms were assessed using Western Ontario and McMasters Universities Arthritis Index (WOMAC) at baseline, month 3, 6, 12 and 24. Multilevel mixed-effect models were used to estimate the association between exposures and outcomes adjusting for potential confounders.

**Results:** Over 24 months, 340 participants (82.3% retention rate) completed the study. The prevalence and incidence of depression were 25.4% and 11.2%, respectively. Depression improved more in the vitamin D supplementation group (β: −0.45, 95% CI: −0.84 to −0.07) compared to the placebo group (β: 0.21, 95% CI: −0.19 to 0.61) (p=0.02) and in those participants who maintained vitamin D sufficiency (β: −0.44, 95% CI: −0.88 to −0.00) compared to those who did not maintain sufficient (β: 0.40, 95% CI: −0.18 to 0.97) (p=0.02) over 24 months.

**Table 1**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Mean change (95% CI)</th>
<th>P value</th>
<th>Between-group difference (95% CI)</th>
<th>Mean change (95% CI)</th>
<th>Between-group difference (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo group</td>
<td>0.21 (-0.19 to 0.61)</td>
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<td>-0.66 (-1.22 to -0.11)</td>
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<tr>
<td>Vitamin D</td>
<td>-0.45 (-0.84 to -0.04)</td>
<td>0.02</td>
<td></td>
<td>-0.07</td>
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</tbody>
</table>

**Abstract FR05522 — Table 1. Effects of vitamin D supplementation over 24 months on change in PHQ-9**

Changes in outcomes are generated from mixed-effect models adjusted for age, sex and body mass index.

**Table 2**

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Mean change (95% CI)</th>
<th>Between-group difference (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not maintaining sufficient vitamin D (n=114)</td>
<td>0.40 (-0.18 to 0.97)</td>
<td>-0.83 (-1.56 to -0.11)</td>
<td>0.02</td>
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<tr>
<td>Maintaining sufficient vitamin D (n=226)</td>
<td>-0.44 (-0.88 to -0.00)</td>
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</tbody>
</table>

**Abstract FR05522 — Table 2. Effects of vitamin D status over 24 months on change in PHQ-9**

Changes in outcomes are generated from mixed-effect models adjusted for age, sex and body mass index.
ZOLEDRONIC ACID PLUS PREDNISOLONE VERSUS CENTRAL SENSITISATION IN HAND OSTEOARTHRITIS


Acknowledgements: We specially thank the participants who made this study possible, and we gratefully acknowledge the role of Vitamin D Effect on Osteoarthritis Study staff and volunteers in collecting the data.

Disclosure of Interest: None declared

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ZOLEDRONIC ACID PLUS PREDNISOLONE VERSUS ZOLEDRONIC ACID ALONE OR PLACEBO IN THE TREATMENT OF KNEE OSTEOARTHRITIS: A RANDOMISED TRIAL

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Background: Disease-modifying therapeutic options are needed for patients with osteoarthritis (OA). Zoledronic acid (ZA) is a potent option as it reduced both knee pain and knee bone marrow lesion (BML) size over 6 months in patients with knee OA. However, ZA infusions are often accompanied by a suite of side effects within 3 days of infusion (acute phase reactions (APRs)), which include flu-like symptoms. These may be caused by upregulation of pro-inflammatory cytokines. A preliminary study (n=20) suggested that a combination of ZA and prednisolone (VOLT01) was superior to ZA alone in reducing APRs and knee pain in knee OA patients. A larger study was needed to confirm these findings and examine the new combination’s effect on OA outcomes.

Objectives: To compare the effect of once-off infusion of ZA, VOLT01 and placebo on APRs, knee BML size and knee pain symptoms over 6 months in knee OA patients with significant knee pain and BMLs.

Methods: Knee OA patients; 50 years with significant knee pain (defined as a 100 mm Visual Analogue Scale (VAS) ≥40 mm) and knee BMLs visualised on ultrasound (grey scale (GS) synovitis and power Doppler activity (PD)) and conventional radiographs of both hands. GS-synovitis was scored on a semi-quantitative 0–3 scale and PD to be present or not. The bilateral interphalangeal, metacarpophalangeal, first carpometacarpal and scaphotrapeziotrapezoidal joints were scored for global HOA (using Kellgren and Lawrence scale (KL, 0–4)). Erosive HOA in the interphalangeal joints was defined with the Verbruggen-Veys anatomical phase score (VV). In addition, participants answered a question about the year of onset of their hand symptoms.

CS was measured with temporal summation (TS), the increase in perceived pain on repetitive noxious stimuli, using a mechanical probe. First, probes with increasing weight (32, 64, 128, 256 or 512mN) were applied at the wrist until the patients reported pain of at least 4/10. The selected probe was applied to the wrist times at

Universities Osteoarthritis Index (WOMAC) and VAS over 6 months. Mixed effect models were performed for data analyses. Analyses for change in knee pain and function scores were adjusted for baseline imbalanced values (baseline pain and utility scores, and pain medications). Non-inferiority margins were defined as 140 mm² for change in knee BML size and 8 mm for change in knee pain and function scores (WOMAC pain and function scores were averaged to a 100 mm VAS).

Results: 117 knee OA patients (63 females, mean ± standard deviation (SD) age 62.2±6.1 years) were enrolled. At baseline, mean ± SD knee pain VAS score was 50.1±18.9 mm and median BML size 370 mm². APRs were more frequent in the two active treatment groups (ZA: 87%; VOLT01: 90%) than the placebo group (55%) (both p<0.01). Compared to placebo, neither ZA nor VOLT01 significantly reduced BML size (ZA mean difference [95% CI] -21.6 [-103.0 to +59.9], VOLT01 -62.0 [-142.5 to +18.4]) or knee pain scores (WOMAC pain: ZA 2.6 [8.5 to +13.6], VOLT01 -8.1 [18.8 to +2.6]; WOMAC pain: ZA 5.4 [-6.4 to +17.1], VOLT01 -7.7 [-19.0 to +3.6]) over 6 months, but WOMAC knee function improved significantly (-9.9 [-18.2 to +1.6], p=0.02) in VOLT01-treated group. VOLT01 was non-inferior to ZA in reducing knee BML size and superior to ZA in reducing knee pain and function scores (figure 1).

Conclusions: Combining prednisolone with ZA does not appear useful for reducing APRs, though there may be a small benefit over ZA alone for knee symptoms. Neither showed evidence of disease modification by changing BML size.

Disclosure of Interest: None declared


CENTRAL SENSITISATION IN HAND OSTEOARTHRITIS AND ASSOCIATIONS WITH RADIOGRAPHIC SEVERITY, SYNOVITIS ON ULTRASOUND AND SYMPTOM DURATION

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Background: Patients with painful hand osteoarthritis (HOA) have enhanced central pain sensitisation (CS). Structural and inflammatory joint tissue damage over time might lead to CS. However, increased pain sensitisation can also represent an ‘a priori trait’ of a subgroup of patients. This study explored whether structural pathology, inflammation and symptom duration of HOA are associated with enhanced CS.

Methods: Through a cross-sectional study we included 300 subjects (89% women, median age 61 years (IQR 57, 67), mean body mass index (BMI) 26.5 (SD 4.9) kg/m²) with clinical and/or ultrasound verified HOA. All were examined with ultrasound (grey scale (GS) synovitis and power Doppler activity (PD)) and conventional radiographs of both hands. GS-synovitis was scored on a semi-quantitative 0–3 scale and PD to be present or not. The bilateral interphalangeal, metacarpophalangeal, first carpometacarpal and scaphotrapeziotrapezoidal joints were scored for global HOA (using Kellgren and Lawrence scale (KL, 0–4)). Erosive HOA in the interphalangeal joints was defined with the Verbruggen-Veys anatomical phase score (VV). In addition, participants answered a question about the year of onset of their hand symptoms.

CS was measured with temporal summation (TS), the increase in perceived pain on repetitive noxious stimuli, using a mechanical probe. First, probes with increasing weight (32, 64, 128, 256 or 512mN) were applied at the wrist until the patients reported pain of at least 4/10. The selected probe was applied to the wrist times at