in prediction accuracy between constructs was further assessed as integrated discrimination improvement (IDI). Similar AUC and IDI constructs evaluated the transition to obstructive or extensive atherosclerosis at follow-up in patients with baseline non-extensive or non-obstructive disease.

Results: High hs-cTnI (>1.5pg/ml) added to FRS-DA increased AUC from 0.717 to 0.731 (Figure 1A) and improved prediction accuracy for baseline plaque [IDI=0.041 (SE)=0.017, p=0.015]. In contrast, a-b2GPI-IgA did not [IDI=0.005 (0.006), p=0.47] and the combination offered no added benefit to the hs-cTnI model alone. Similar observations were made for CAC. Presence of a-b2GPI-IgA independently associated with coronary plaque progression (IRR=1.67 [95%CI 1.04-2.67]), whereas hs-cTnI did not. Likewise, a-b2GPI-IgA associated with transition to extensive or obstructive disease independently of FRS-DA (OR=13.48 [95%CI 2.09-86.99]). Notably, 71.4% of a-b2GPI-IgA positive patients with high hs-cTnI progressed to extensive or obstructive disease compared to 7.7% of a-b2GPI-IgA negative subjects with high hs-cTnI (p=0.008). Addition of a-b2GPI-IgA to FRS-DA in patients with prevalent non-extensive non-obstructive plaque increased AUC from 0.785 to 0.900 (Figure 1B) and significantly improved the prediction for development of obstructive or extensive atherosclerosis at follow-up [0.387, (0.13), p=0.003].

Figure 1. (A) Diagnostic accuracy for prediction of occult coronary atherosclerosis at baseline. FRS-DA alone is the base model followed by addition of hs-cTnI or a-b2GPI-IgA individually or combined. **(B)** Diagnostic accuracy for progression from non-obstructive and non-extensive plaque at baseline to obstructive or extensive atherosclerosis at follow-up.

Conclusion: High hs-cTnI improved the risk of baseline plaque presence beyond clinical risk score and may trigger an initial non-invasive coronary atherosclerosis evaluation. A-b2GPI-IgA presence may justify a follow-up evaluation in patients with non-extensive, non-obstructive plaque at baseline.

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THU0531 **A PROSPECTIVE STUDY EVALUATING THE ROLE OF ⁶⁸GA-RGD2 PET/CT ANGIOGENESIS IMAGING IN ASSESSING DISEASE ACTIVITY AND TREATMENT RESPONSE IN RHEUMATOID ARTHRITIS AND ITS COMPARISON WITH DAS28**

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Background: PET/CT imaging of synovial angiogenesis using ⁶⁸Ga-RGD (cyclic tripeptide agent targeting $\alpha_v\beta_3$ integrin) to study disease activity in rheumatoid arthritis (RA) has been demonstrated earlier in a few patients. However, post treatment changes in disease activity on ⁶⁸Ga-RGD₂ PET/CT imaging have not been adequately assessed.

Objectives: To compare the performance of ⁶⁸Ga-RGD₂ PET/CT with disease activity score (DAS) 28 in assessing disease activity and treatment response in RA.

Methods: Thirty patients (24F, 6M) aged 43±12 years with clinically diagnosed RA were prospectively studied. After calculation of DAS28 by a rheumatologist, all 30 patients underwent ⁶⁸Ga-RGD₂ PET/CT scan. Of these, 27 patients underwent a second ⁶⁸Ga-RGD₂ PET/CT scan and clinical assessment after at least 3 months of treatment. Total body and regional images of the upper limbs were acquired and interpreted by two nuclear medicine physicians blinded to the clinical findings. Joints showing focally increased tracer uptake compared to the background were considered positive and joints showing uptake equal to or less than background were considered negative.

Data of 30 patients were used for inter-observer and inter-modality agreement calculations. Changes in PET parameters and DAS28 were compared in 27 patients to assess treatment response.

Results: Out of 1560 joints examined in the initial scan, 394 were positive on PET/CT compared to 348 on clinical evaluation. Inter-observer agreement between nuclear medicine physicians was excellent (Cohen's kappa 0.92, p<0.05) and inter-modality agreement between PET and clinical examination was moderate (Cohen's kappa 0.55, p<0.05). The DAS28 and SUVmax values (highest and average) of 27 patients showed significant reduction on follow-up compared to the initial evaluation. There was significant correlation between percentage change in DAS28 and percentage change in scan parameters like PET positive joint counts (0.689, p<0.001), average SUVmax (0.712, p<0.001) and highest SUVmax values (0.558, p=0.003) of scan-positive joints in 27 patients. Additional advantages of ⁶⁸Ga-RGD₂ PET/CT included objective assessment, whole body evaluation of all small and large joints, and greater reproducibility.

Conclusion: ⁶⁸Ga-RGD₂ PET/CT is a promising tool for objective assessment of disease activity and treatment response in patients with RA.

Table 1. Clinical and PET parameters of the patients

Parameter	Initial data (n=27)	Follow-up data (n=27)
	Mean (SD)/Median (IQR)	Mean (SD)/Median (IQR)
TJC(28)	10 (5-13)	3 (2-4)
SJC(28)	6 (3-7)	1 (0-2)
ESR	25 (20-41)	24 (18-35)
PtGA	6.0 (5.0-6.0)	3.0 (2.0-4.0)
DAS28(3)	5.14 (0.85)	3.74 (0.88)
DAS28(4)	5.60 (0.90)	3.80 (0.96)
PET positive Joints	12 (7-8)	4 (2-9)
aSUVmax	2.08 (1.68-2.52)	1.79 (1.00-2.06)
hSUVmax	3.45 (2.71-4.70)	3.34 (1.95-4.25)

TJC/SJC: tender/swollen joint counts; ESR: erythrocyte sedimentation rate; PtGA: patients global assessment scale; DAS: disease activity score; aSUVmax/hSUVmax: average/highest SUVmax (maximum standardized uptake value); SD: standard deviation; IQR: interquartile range

Figure 1. ⁶⁸Ga-RGD₂ PET scan of a 26-year female RA patient on treatment. **A.** Initial scan shows increased tracer uptake in multiple joints of upper and lower limbs and tendon sheaths of hands and ankle region (arrows); DAS28 was 4.56 (moderate disease activity) and ESR 12mm/1st hour. **B.** Follow-up scan after 4 months shows resolution of tracer activity in the previously involved joints with only a mild focus persisting in the left knee joint; DAS28 was 1.73 (clinical remission according to ARA) and ESR 08mm/1st hour.

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THU0532 **SEMIQUANTITATIVE ANALYSIS OF BONE SCINTIGRAPHY TO PREDICT SPINAL PROGRESSION IN EARLY AXIAL SPONDYLOARTHRITIS: A PILOT STUDY**

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Background: Axial spondyloarthritis (axSpA) is a chronic inflammatory disease that typically affects the axial joint and entheses. Abnormal hyperplasia of osteoblasts in the vertebral corner is the underlying pathogenesis of syndesmophyte

formation. Therefore, detecting abnormal osteoblast hyperactivity in the axial joints of patients with axSpA might be an attractive imaging modality to detect potential of spinal structural progression. Bone scintigraphy is used to evaluate the sites of active bone formation by detecting osteoblast activities and visualizing the whole skeleton at once. Therefore, bone scintigraphy is a theoretically ideal imaging modality to predict abnormal bone growth of axial joints in patients with axSpA.

Objectives: To investigate whether bone scintigraphy with semiquantitative analysis in patients with early axial spondyloarthritis (axSpA) has prognostic value for predicting spinal structural progression of these patients after 2 years.

Methods: The records of 53 patients with early axSpA who underwent baseline bone scintigraphy were reviewed retrospectively. The sacroiliac joint to sacrum (SIS) ratio of bone scintigraphy was measured for semiquantitative analysis, and modified Stoke Ankylosing Spondylitis Spinal Score (mSASSS) and syndesmophyte growth were calculated at baseline and after 2 years. Receiver operating characteristic (ROC) curve analysis was used to determine the cutoff for the SIS ratio of bone scintigraphy. To identify factors associated with significant spinal structural progression, univariate and multivariate logistic regression analyses were performed. Significant progression of spinal structural damage over 2 years was defined as an increase of mSASSS of at least 2 units for 2 years or new syndesmophyte growth/bridging of pre-existing syndesmophytes.

Results: Multivariate regression analysis revealed obesity ($P = 0.023$), current smoking status ($P = 0.012$), and high SIS ratio of bone scintigraphy ($P = 0.015$) as independent predictors for worsening mSASSS by at least 2 units over 2 years. For new syndesmophyte growth/bridging of pre-existing syndesmophytes over 2 years, current smoking ($P = 0.013$), high SIS ratio of bone scintigraphy ($P = 0.025$), and pre-existing syndesmophyte ($P = 0.036$) were independent predictors.

Conclusion: Semiquantitative analysis of bone scintigraphy (high SIS ratio) in patients with early axSpA may be useful for identifying patients at high risk for spinal structural progression after 2 years.

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THU0533

A SINGLE MRI DIXON SEQUENCE TO ASSESS DISEASE ACTIVITY AND CARTILAGE IN EARLY RHEUMATOID HANDS: ONE SEQUENCE TO ASSESS THEM ALL?

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Background: OMERACT recommends three "core set" MRI sequences with an optional cartilage-dedicated sequence to perform Rheumatoid Arthritis (RA) MRI scoring (RAMRIS) (1). Dixon method allows the production of four different images from a single MRI sequence.

Objectives: To test a short MRI protocol based on a single Dixon sequence to assess disease activity and cartilage in hands of patients with early RA.

Methods: Twenty-four patients (16 women, mean age 45.7 years old) with early DMARD-naïve RA meeting the ACR/EULAR 2010 criteria were prospectively included. Both hands of each patient were imaged with MRI including contrast-enhanced T1-weighted Dixon and OMERACT "core set" MRI sequences and with conventional radiography.

Two musculoskeletal radiologists (R1 and R2) separately assessed disease activity according to RAMRIS scoring system based on the Dixon images (contrast-enhanced T1-weighted Dixon water-only images to score synovitis, tenosynovitis and osteitis and contrast-enhanced T1-weighted Dixon fat-only images to score erosions) and the three OMERACT "core set" MRI sequences (contrast-enhanced fat-saturated T1-weighted images to score synovitis and tenosynovitis, fat-saturated T2-weighted images to score osteitis and T1-weighted images without contrast-material injection to score erosions).

One radiologist (R1) separately measured the thickness of the cartilage in the joints corresponding to those assessed by the Sharp/van der Heijde modified scoring method on contrast-enhanced T1-weighted Dixon out-of-phase images and radiographs (2).

RAMRIS scoring and measurement of the cartilage thickness were repeated by R1 to assess intra-observer agreement. Statistical analysis was based on intra-class correlation coefficients (ICC) with 95% confidence interval to assess inter-technique, intra-observer and inter-observer agreement. The strength of agreement was interpreted as follows: ≤ 0 , poor; 0.01-0.20, slight; 0.21-0.40, fair; 0.41-0.60, moderate; 0.61-0.80, substantial and ≥ 0.81 , excellent.

Results: Agreement between total RAMRIS scores obtained with the Dixon water- and fat-only images and total RAMRIS scores obtained with the OMERACT sequences was excellent for R1 (0.94; 0.86-0.97) and R2 (0.91; 0.81-0.96). Intra-observer agreement was excellent with Dixon images (0.97; 0.92-0.98) and OMERACT sequences (0.96; 0.90-0.98). Inter-observer agreement was excellent with Dixon images (0.92; 0.82-0.96) and OMERACT sequences (0.93; 0.85-0.97).

Agreement between the measures of cartilage thickness on the Dixon out-of-phase images and the measures of cartilage thickness on radiographs was substantial (0.71; 0.66-0.75). Intra-observer agreement was excellent with Dixon out-of-phase images (0.94; 0.93-0.95) and radiographs (0.93; 0.92-0.94).

Conclusion: An MRI protocol based on a single contrast-enhanced T1-weighted Dixon sequence allows reproducible RAMRIS scoring and measurement of the cartilage thickness. Further studies should be performed to evaluate the value of a short MRI protocol based on the Dixon method to monitor disease activity including cartilage loss in treated RA patients.

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THU0534

LUNG ULTRASOUND IN PATIENTS WITH SECONDARY INTERSTITIAL LUNG DISEASES

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Background: Currently, lung ultrasound (LUS) is increasingly used in rheumatology.

Objectives: To evaluate the relationship between lung ultrasound and pulmonary function and disease activity in patients with rheumatic diseases with secondary lung involvement.

Methods: Thirty patients with rheumatic diseases were included in the study, who, according to the data of the high-resolution RCT of lungs (64-slice CT system Philips Diamond Select Brilliance), showed interstitial lung involvement as a type of nonspecific interstitial pneumonia. In 4 patients, mixed connective tissue disease (MCTD) was diagnosed, 20 had systemic vasculitis (SV), and 6 had rheumatoid arthritis (RA). The mean age of the patients was 56.55 ± 10.59 , the duration of the disease was 2.3 ± 1.2 years. All patients underwent a standard clinical examination, the following indices and scales were used to assess the activity of the underlying disease: VDI damage index, Birmingham systemic vasculitis activity scale (BVAS), RA activity scale (DAS 28-CRP). The functional state of the lungs was assessed using spirometry, bodipletismography, gas diffusion "single breath". LUS was carried out for the evaluation of the location and number of B-lines on both right and left hemithoraces using commercially available echographic equipment with a 5-12 MHz linear transducer (Accuvix A30, Samsung Medison).

Results: Most patients had an average number of B-lines $24.5[11.5;34.0]$. There were no significant differences in the number of B-lines between groups of patients of different nosologies. The total number of B-lines correlated with the index of activity of systemic vasculitis BVAS ($p < 0.05$; $r = 0.83$). There were no statistically significant correlations with clinical manifestations of pulmonary involvement.

Conclusion: Lung ultrasound may be useful in screening secondary lung involvement in patients with rheumatic diseases with high activity.

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