All CTs were blindly processed by a rheumatologist using OsiriX to obtain the QCTi (kurtosis, skewness, mean lung attenuation). The semiquantitative scores and the QCTi were correlated through the Spearman rank test. QCTi distribution and discriminative ability were, respectively, verified using Mann-Whitney test and ROC curves.

Results: The majority of QCTi showed a statistically significant correlation of moderate degree ($0.40 < r < 0.59$) with the semiquantitative assessment (p -value < 0.01).

Patients with severe and mild ILD had dissimilar QCTi values ($p < 0.001$). Among QCTi, kurtosis (tKurt) had the best discriminative ability (AUC=0.80, 95% CI 0.65 to 0.91, $p < 0.0001$). The best tKurt cut-off value that identifies patients with severe pulmonary involvement was 3.67.

Conclusions: In RA-ILD, QCTi correlate with the CT semiquantitative scores. Our preliminary findings suggest that RA-ILD severity is related to QCTi. Moreover a QCTi (tKurt) has a cut-off that can discriminate patients with severe ILD. So, QCTi may become simple tools to help the rheumatologist to quickly evaluate the severity of ILD in RA patients and estimate the prognosis.

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FRI0561 MACROPHAGE PET IMAGING FOR PREDICTING TREATMENT OUTCOME OF DE NOVO RHEMATOID ARTHRITIS

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Background: Treatment of rheumatoid arthritis (RA) should be initiated as early as possible to prevent further damage and functional disability.¹ However, clinical assessment of treatment response usually takes 12 weeks or longer. Tools that detect earlier response can improve timely treatment decision. Previously, positron emission tomography (PET) using the macrophage tracer [11C]-(R)-PK11195 has shown promise for both early diagnosis and monitoring response to therapy in RA patients.^{2,3}

Objectives: To determine the value of [11C]-(R)-PK11195 PET to identify RA responders and non-responders to COBRA-light therapy after 2 weeks of treatment.

Methods: Twenty RA patients (female 10/20, age 54±10 years) with clinically active *de novo* RA based on ACR/EULAR criteria⁴ and at least two clinically active joints were included. All patients were given COBRA-light therapy (methotrexate and prednisolone). They received standard clinical care and (clinical) evaluations were performed at 0, 2, 4 and 12 weeks of treatment. Whole body [11C]-(R)-PK11195 PET-CT scans were acquired at baseline and after 2 weeks of treatment. An experienced reader blinded to clinical data scored the 44 joints of the Disease Activity Score (DAS44) visually from 0 to 3. PET response was pre-defined as either positive if there was a decrease in whole body PET score of $\geq 10\%$ after two weeks, or as negative if the score increased or remained unchanged. PET outcome was compared with EULAR clinical response at 12 weeks.⁵

Results: After 12 weeks of COBRA-light treatment, 16 out of the 20 patients were classified as EULAR responders (13 'good' and 3 'moderate') and 4 patients as non-responders. At baseline, a total of 134 PET positive lesions were observed in the joints of 20 patients, ranging from 1 to 21 lesions per patient. Most frequently, lesions were located in hands and feet: 19% in the wrists (e.g. figure 1A), 37% in the small hand joints and 39% in the small feet joints. After 2 weeks of COBRA light treatment, the number of PET positive lesions decreased to 122 (e.g. figure 1B).

A positive whole body PET response was observed in 13 patients. Table 1 shows a side by side comparison between PET response after 2 weeks and EULAR response after 12 weeks. In 15 of the cases (75%), there was an agreement between the PET response and EULAR response.

PET response at 2 weeks	EULAR response at 12 weeks	
	Positive	Negative
Positive	12	1
Negative	4	3

Abstract FRI0561 – Table 1. Correspondence between early PET response and clinical EULAR response.

Abstract FRI0561 – Figure 1

Conclusions: This is the first study to explore the potential of macrophage PET for monitoring therapy in early RA. Preliminary visual assessment demonstrates its ability to monitor arthritis activity changes within 2 weeks of treatment. This offers a window of opportunity for development of precision medicine in the early phase of treatment. Future analyses are in progress to assess whether performance can be further improved by quantification of tracer uptake.

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FRI0562 ASSOCIATION BETWEEN JOINT REGIONS WITH ULTRASOUND-DETERMINED SYNOVITIS AND SYSTEMIC INFLAMMATORY MARKERS

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Background: It is unknown which joint arthritis the inflammatory markers such as CRP or MMP-3 reflect.

Objectives: We analysed the association between joint regions with ultrasound-determined synovitis and systemic inflammatory markers.

Methods: We enrolled 152 patients with untreated arthritis and performed musculoskeletal ultrasound on 40 joints and determined a semiquantitative grade for power Doppler (PD) signals. We analysed the associations between PD scores in 8 joint regions and CRP/MMP-3 levels using multiple linear regression models with forced entry method.

Results: Mean age was 55 years and 112 patients were female. Median CRP and MMP-3 were 0.36 mg/dl and 65.7 ng/ml. Median total PD score was 2. Standard regression coefficients for 8 joint regions were –0.009 for MCPs, 0.05 for PIPs, 0.372 for wrists, 0.183 for elbows, 0.628 for shoulders, 0.377 for knees, 0.261 for ankles, and –0.0131 for MTPs in a regression model to explain CRP using PD scores as dependent variables. Standard regression coefficients for the same joint regions were –5.134, –4.449, 24.061, 27.839, 22.508, 64.108, 36.501, and 2.539 to explain MMP-3.

Conclusions: Systemic inflammatory markers such as CRP and MMP-3 do not accurately reflect the inflammation in small joints. Conversely, it is necessary to weight the large joints for the global ultrasound synovitis score to represent the severity of systemic inflammation.

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FRI0563 MUSCULOSKELETAL ULTRASOUND (MSUS) IS SUPERIOR TO CLINICAL EXAMINATION REGARDING DETECTION OF ARTHRITIS IN PATIENTS WITH SYSTEMIC SCLEROSIS

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Background: Arthralgia is a frequent complaint in patients with systemic sclerosis (SSc). However, correct assessment of arthritis remains challenging especially in patients with severe scleroderma and/or soft tissue oedema.

Objectives: This study investigates the frequency of arthritis in SSc using musculoskeletal ultrasound (MSUS) compared to clinical investigation and in SSc.

Methods: Effusion, as well as synovitis in B- and PD-mode using MSUS was assessed in 31 consecutive patients with SSc; hand, finger, upper and lower ankle joints as well as metatarsophalangeal (MTP) joints were scanned totaling 1364 joints. In all patients carotid intima media thickness (CIMT) was assessed by Doppler ultrasound. Arthritis disease activity was assessed by the HAQ, and the DAS66/68, respectively; joint pain and patient global health (PGH) were quantified on a visual analogue scale (VAS). Skin involvement was measured using the modified Rodnan Skin Score (mRSS). CRF such as smoking, hypertension or positive family history were registered

Results: All patients were negative for ACPA and rheumatoid factors. 58.06% (n=18) of patients had joint pain, 22.58% (n=7) clinical joint swelling. In MSUS, 82 joints with effusion were detected in 23 patients (I°: n=50 joints, II°: n=32 joints). 25 joints in 11 patients were detected by B-mode synovitis (I°: 9 joints, II°: 16 joints). 7 joints in 3 patients showed PD-synovitis (I°: 2 joints, II°: 5 joints). In 10 patients MSUS could detect effusion where clinical examination could not; none of the clinically suspicious joints had effusion in MSUS. B-mode synovitis was detected in 3 clinically normal patients, in 6 patients with joint pain, and in 3 patients with joint pain and swelling. 1 patient with PD-synovitis each had TJC-/SJC-, TJC+/SJC+, or TJC+/SJC- at clinical examination. The overall correlation of MSUS with clinical examination was poor (p>0.05). B-mode synovitis and PD-mode synovitis prevailed the MTPs (60%, n=15 and 85.71%, n=6, respectively). For median nerves, a cutoff area of >13 mm² was deemed pathologic, >11 mm² and <13 mm² was intermediate. 11/31 patients had either pathologic or intermediate median nerves. Doppler ultrasound found 10 pathological CIMT in 8 individual patients; carotid plaques were detected in 25 carotid arteries in 20 patients. Patients with CIMT and/or carotid plaques were elderly (60.52 years±10.84), long term sick (156.48±123.19 months), and had at least one cardiovascular risk factor.

Conclusions: In patients with arthralgia MSUS could detect clinically not obvious arthritis. Especially in joints with soft tissue oedema and sclerotic skin MSUS was superior to clinical examination. Interestingly, arthritis was most frequently found in the MTP and wrist joints supporting recent data.¹ In this small cohort there was no significant correlation between CRP positivity and arthritis. Not surprisingly, carotid plaques were more frequent in elderly and/or long-term patients with one or more CRF. We plan to pursue this investigation in a larger cohort.

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FRI0564 ULTRASONOGRAPHIC EVALUATION OF SHOULDER TENDONS IN PATIENTS WITH HASHIMOTO'S DISEASE

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Background: Hashimoto's disease is an autoimmune disease characterised by autoantibody positivity in the blood and diffuse lymphocyte infiltration in the thyroid. Thyroxine is an important hormone in collagen and matrix metabolism. Low levels

of thyroid hormones or antibodies positivity may lead to tendon pathologies and subsequent shoulder pain in patients with Hashimoto's disease.

Objectives: 1) To investigate tendon thickness and pathologies in patients with Hashimoto's disease. 2) To investigate if shoulder pain in Hashimoto's disease is associated with ultrasonographic tendon pathologies.

Methods: Assuming a 0.5 mm mean difference and 0.7 mm SD of thickness at rotator cuff tendons with 80% power and 5% significance 119 female subjects (40 patients euthyroid Hashimoto's disease, 28 subclinical hypothyroid Hashimoto's disease and 51 healthy subjects) were recruited.¹ Participants were divided into three groups: Group 1: patients with subclinical hypothyroid Hashimoto's disease, Group 2: patients with euthyroid Hashimoto's disease, Group 3: healthy controls. A rheumatologist experienced in musculoskeletal ultrasonography and blind to clinical data of the patients evaluated the thickness of biceps, subscapularis, supraspinatus, infraspinatus tendons at both shoulders according to standard protocol.² The presence of subacromial bursitis, effusion, tendon rupture or tendinosis were recorded. The participants of TSH (thyroid stimulated hormone), free T3 (triiodothyronine), free T4 (thyroxine), anti TPO (thyroid peroxidase) and anti TG (thyroglobulin) antibodies levels were measured. In addition the presence and duration of shoulder pain of the participants were recorded.

Results: Height, weight, BMI (body mass index), free T3 and free T4 levels were similar between three groups (p=0.830, p=0.205, p=0.374, p=0.430 and p=0.497, respectively). Tendon thicknesses in patient groups are presented in table 1. Biceps brachii, subscapularis, supraspinatus and infraspinatus tendon thicknesses were increased significantly in both euthyroid Hashimoto's disease and subclinical hypothyroid Hashimoto's disease groups at dominant and non-dominant arms compared to healthy controls. However there was no such difference between euthyroid Hashimoto's disease and subclinical hypothyroid Hashimoto's disease groups. There was no correlation between levels of TSH, anti TPO, anti TG and tendon thickness. Two participants in three groups had shoulder pain for 1–3 months. These participants had no ultrasonographic shoulder tendon pathology.

Abstract FRI0564 – Table 1. Differences between euthyroid Hashimoto's disease, subclinical hypothyroid Hashimoto's disease and healthy controls in dominant and non-dominant arms.

	Group 1 (n=28)	Group 2 (n=40)	Group 3 (n=51)	P value	P value*	P value**	P value***
Dominant arm							
Biceps brachii	2.39±0.63	2.64±0.65	2.24±0.43	0.007	0.798	0.004	0.019
Subscapularis	4.09±0.89	3.96±0.64	3.66±0.52	0.017	0.397	0.021	0.018
Supraspinatus	4.90±0.80	4.96±0.99	4.50±0.72	0.034	0.410	0.032	0.028
Infraspinatus	1.96±0.81	2.16±0.84	1.52±0.28	0.000	0.847	0.000	0.020
Acromioclavicular distance	10.57±1.09	10.25±1.40	10.41±1.28	0.419	0.176	0.592	0.436
Non-dominant arm							
Biceps brachii	2.59±0.61	2.48±0.50	2.24±0.45	0.030	0.798	0.020	0.040
Subscapularis	4.21±0.92	4.06±0.68	3.74±0.50	0.018	0.516	0.023	0.016
Supraspinatus	4.80±0.73	4.84±0.92	4.44±0.75	0.022	0.793	0.025	0.017
Infraspinatus	2.07±0.95	2.05±0.81	1.55±0.31	0.001	0.476	0.000	0.043
Acromioclavicular distance	10.53±1.03	10.21±1.29	10.25±1.33	0.363	0.162	0.990	0.224

Data are presented as the mean ± standard deviation. All data are presented in millimeters. P<0.05. Group 1: subclinical hypothyroid Hashimoto's disease; Group 2: euthyroid Hashimoto's disease; Group 3: Healthy controls

p value* difference between patients with euthyroid Hashimoto's disease and subclinical hypothyroid Hashimoto's disease

p value** difference between patients with euthyroid Hashimoto's disease and healthy controls

p value*** difference between patients with subclinical hypothyroid Hashimoto's disease and healthy controls

Conclusions: Presence of autoimmune thyroid disease may lead to increased shoulder tendon thickness. However increase in tendon thickness is not seemed to be associated with shoulder pain.

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