Abstract FRI0555 – Table 1. Mean SWV and differences in the examined muscles between myositis patients and controls

Muscle	Shear wave velocity (m/s)		Mean difference (95% CI)	Difference percentage	Significance (p value)
	Healthy	Myositis			
Vastus lateralis	1.74	1.42	-0.32 (0.19, 0.46)	18.4%	<0.001*
Rectus femoris	1.77	1.53	-0.24 (0.12, 0.34)	13.6%	<0.001*
Vastus medialis	1.66	1.45	-0.21 (0.06, 0.35)	12.7%	<0.001*
Vastus intermedius	1.89	1.60	-0.29 (0.11, 0.47)	15.3%	<0.001*
Biceps brachii	1.94	1.79	-0.15 (-0.01, 0.30)	7.7%	0.088
Biceps femoris	1.73	1.38	-0.35 (0.24, 0.46)	20.2%	<0.001*
Semitendinosus	1.72	1.45	-0.27 (0.09, 0.43)	15.7%	<0.001*
Semimembranosus	1.75	1.38	-0.37 (0.28, 0.45)	21.1%	<0.001*

Conclusions: Muscle elasticity in myositis patients has been shown to be 21% lower in comparison to healthy participants and seems to moderately correlate with disease activity, muscle strength and function. To our knowledge, this is the first study to show that shear wave elastography can detect changes in muscle elasticity in myositis patients. Further validation is required to evaluate the value of this novel ultrasound technology as an imaging biomarker for myositis.

Disclosure of Interest: None declared

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FRI0556 AUTOMATED SCORING OF KNEE OSTEOARTHRITIS (OA) ON ROUTINE RADIOGRAPHS IDENTIFIES DISEASE SEVERITY IN OA

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Background: Knee osteoarthritis (OA) causes pain and limited function of the knee, linked to cartilage loss, bone remodelling and inflammation¹.

Objectives: We aimed to find out whether joint space measures can stratify patients into mild and advanced OA using an automated scoring tool².

Methods: 86 weight-bearing radiographs (target joint: 41 left, 45 right knee) were analysed by using ImageBiopsy Lab software (JSx). Automated joint space (JS) measures were joint space width (JSW), minimum height (minH) and joint space area/region of interest (JSA/ROI, in mm²). JS measures were compared against Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) of pain, stiffness and function, with each subscale score normalised to a total score of 100. Body-mass index (BMI) and age data were available as potential covariates. Image analysis was initiated with landmarks automatically placed on the end of tibial plateau for each compartment, with fine manual adjustment of landmarks and contour spline if necessary. Clinical scores were compared between mild OA (n=24) and advanced OA (n=62); patient groups were defined according to their clinical pathway of standard care: medical management for early OA and knee replacement for advanced OA. SPSS Statistics 25 was used for analysis. An independent-samples t-test was used to compare the automated radiological and clinical scores between the groups of different OA severity. Subsequently the General Linear Model (GLM) was used to evaluate group differences with appropriate covariates and fixed factors.

Results: Joint space measures were strongly linked to the two clinical groups of OA severity (mild and advanced OA). Differences were significant in the medial JSA/ROI (p<0.001), medial JSW (p=0.001), medial MinH (p<0.001), WOMAC pain (p=0.001), stiffness and function (both p=0.003). Age (p=0.014) and BMI (p=0.019) were also different between the two groups of OA severity in the t-test, and were then used as co-variables in the GLM analysis along with gender and ethnicity as fixed factors. Medial JSA/ROI (p=0.027) and medial MinH (p=0.041) were still significantly different between mild and advanced OA in the multivariate test. Receiving Operating Characteristic (ROC) curves showed that medial JSA/ROI was the better discriminator for severity of OA (AUC=0.738) when compared to WOMAC scores (AUC=0.719 for WOMAC pain).

Abstract FRI0556 – Figure 1. Boxplots showing the relationship between stage of OA (mild and advanced) and (A) medial JSA/ROI, (B) lateral JSA/ROI

Conclusions: Medial joint space measures are possible markers for identifying the stage of disease if only radiographs were used. In particular, medial JSA/ROI may be utilised as an automated tool for characterising patient severity.

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FRI0557 THERMOGRAPHIC ANALYSIS OF HANDS AND WRISTS OF RHEUMATOID ARTHRITIS PATIENTS

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Background: Thermography has been utilised in a number of studies in rheumatoid arthritis (RA),¹ however there is a paucity of evidence as regards to the possibility of applying this non-invasive technology to the detection of synovitis of the hands and wrists. With normative data having been already published,² it is now possible to compare the thermographic characteristics of RA patients without active synovitis to those with a normal thermal distribution in order to determine the baseline characteristics of RA hands and wrists. This would consequently provide a foundation against which further studies investigating RA patients with synovitis can be compared.

Objectives: To determine whether rheumatoid arthritis (RA) patients without active synovitis in their hands exhibit different baseline thermographic patterns of the fingers and palms when compared to healthy individuals

Methods: Data from 31 RA patients were compared to 51 healthy controls. Inclusion criteria were confirmed absence of synovitis by clinical examination and musculoskeletal ultrasound in rheumatoid patients. Thermographic imaging of the regions of interest (ROIs) were obtained as per established protocols²

Results: Significant differences were found between the mean temperatures of the palm regions and fingers of the healthy participants when compared to the palm regions and fingers of their RA counterparts (p=0.001), with the latter group exhibiting higher temperatures in all ROIs. No significant differences were found between ROIs of the palms and fingers of both hands in either group. Logistic regression models confirm that both palm and finger temperature increase significantly in RA

Conclusions: RA patients without active inflammation of the hands demonstrate a significantly higher mean temperature compared to healthy individuals. These findings provide evidence that baseline thermal data in RA differs significantly from healthy individuals. Thermal imaging may have the potential to become an adjunct assessment method of disease activity in patients with RA.

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FRI0558 FURTHER VALIDATION OF THE US7 SCORE IN A LARGE COHORT OF PATIENTS WITH RHEUMATOID ARTHRITIS WITH DIFFERENT DISEASE STAGES

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Background: Musculoskeletal ultrasound (US) is increasingly used in rheumatology clinical practice and research. Standardisation of US scanning techniques and definitions of pathologies is driven forward by the EULAR and OMERACT (Outcome measures in rheumatology) definitions and guidelines. However, no international consensus on a globally accepted US score system on patient level has been achieved so far. The US7 score, first published in 2009, assesses soft tissue lesions (synovitis, tenosynovitis/paratenonitis) as well as bone erosions of 7 preselected joints in one score.¹

Objectives: The aim of this retrospective analysis was to further validate the US7 score by a detailed analysis of affected joint regions in patients with different RA disease stages.

Methods: The US7 score¹ examines the most commonly affected joints in RA, including the wrist, MCP2,3, PIP2,3 and MTP2,5 joints, for synovitis and tenosynovitis/paratenonitis and bone erosions from dorsal, palmar, ulnar (wrist), radial (only MCP2) and lateral (only MTP5) by greyscale (GS) and power Doppler (PD) US. In this retrospective analysis, our population of 524 patients with RA was divided into 3 subgroups – 69 patients (13.2%) with very early RA (max. 6 months disease duration), 98 patients with early RA (>6 month, ≤2 years of disease duration), and 343 patients (65.5%) with established RA (>2 years disease duration). Patients were examined at baseline, 3, 6 and 12 months after starting or changing therapy (csDMARD/bDMARD).

Results: MCP2 and the wrist (especially from dorsal) were most frequently affected by GS/PDUS synovitis in all groups. PDUS showed a slight tendency towards the dorsal versus the palmar joint side being more often affected in all groups. The group of established RA was more often affected by synovitis, while tenosynovitis/paratenonitis appeared more frequently in very early RA. Significant sensitivity to change within 12 months was detected by GSUS in the group of very early RA in all hand joint regions (for synovitis: $p < 0.001$ MCP2,3 and wrist; $p = 0.046$ PIP2; $p = 0.001$ PIP3) and MTP2 ($p = 0.024$), but not in MTP5 ($p = 0.313$). PDUS demonstrated that the palmar sides of MCP2, PIP2 ($p < 0.001$ for all) as well as the dorsal sides of MCP2 ($p = 0.019$), MCP3 ($p = 0.008$), PIP2 and 3 ($p = 0.029$ both), MTP5 ($p = 0.025$) and all wrist sides ($p < 0.001$, $p = 0.013$, $p = 0.001$, respectively) responded significantly to therapy, while MCP3, PIP3 palmar and MTP 2 dorsal did not show significant response ($p = 0.054$, $p = 0.494$, $p = 0.172$, respectively). In established RA, all joint regions included significantly responded to therapy (PIP2 GS: $p = 0.004$, all others $p < 0.001$) in GS as well as PDUS.

Conclusions: Based on these results, we recommend to include wrist and MCP2 joints in a global US score on the patient level to monitor RA, independent of the disease stage, since they are¹ most commonly affected by synovitis and² most responsive to therapy. Tenosynovitis/paratenonitis is frequent in very early RA and should therefore be implemented in an US score monitoring early disease stages.

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FRI0559 BIOMECHANICAL PROPERTIES OF RADIAL BONE ARE DIFFERENT BETWEEN AUTO-ANTIBODY POSITIVE AND NEGATIVE RHEUMATOID ARTHRITIS

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Background: Functional properties of bone in rheumatoid arthritis (RA) are still not well characterised.

Objectives: This study aimed to define the impact of anti-citrullinated antibodies (ACPA) on biomechanical properties in RA.

Methods: Based on on high-resolution peripheral quantitative computed tomography (HR-pQCT) data from the distal radius of ACPA-positive RA (RA+), ACPA-negative RA (RA-) and healthy controls (HC) micro-finite element analysis (μFEA) was carried out to measure failure load and stiffness of bone. (¹ Comparisons of μFEA parameters between groups was calculated and multivariate models were used to determine the role of demographic, disease-specific and structural data of bone strength.

Results: A total of 276 subjects (96 RA+, 84 RA- and 96 HC) were analysed. Age and sex distributions were not significantly different between the three groups. In RA +but not in RA- failure load and stiffness were significantly decreased compared to HC (both $p < 0.001$). Lower bone strength affected both female and male RA +patients and was related to longer disease duration. Impaired bone strength was correlated with altered bone density and microstructural parameters, which were all decreased in RA+. Multivariate models showed that ACPA status ($p = 0.007$) and sex ($p < 0.001$) were independently associated with reduced biomechanical properties of bone in RA.

Conclusions: In summary, μFEA showed that bone strength is significantly decreased in RA +but not in RA- disease.

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FRI0560 QUANTITATIVE CT INDEXES IN THE EVALUATION OF INTERSTITIAL LUNG DISEASE RELATED TO RHEUMATOID ARTHRITIS

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Background: In rheumatoid arthritis (RA), interstitial lung disease (ILD) is the most common pulmonary complication and it is associated with poor prognosis.

The gold standard to detect ILD is the chest Computed Tomography (CT). CT semiquantitative scoring and quantitative methods are used to estimate the extension of ILD; however the first ones are time consuming and they have a considerable inter/intra-observer variability. Quantitative scores are based on the detection of the parameters of distribution of lung attenuation (also called quantitative CT indexes – QCTi).

Previously a good correlation between QCTi calculated through an open-source program (OsiriX) and semi-quantitative score performed by experienced radiologists was demonstrated in a cohort of systemic sclerosis (SSc) patients. Furthermore, the QCTi were demonstrated to be able to discriminate between SSc subjects with different mortality risk based on ILD extent (<20% vs >20%) or lung functional values.

Objectives: Main aim is to investigate if in RA-ILD there is a correlation between QCTi and semiquantitative scores. Secondary aims are: a) to verify if there is a difference of QCTi distribution in RA-ILD patients with severe vs mild ILD extent; b) to evaluate the discriminative ability of QCTi in identifying patients with severe ILD.

Methods: Two experienced radiologists assessed the ILD on chest CT of 45 patients with RA according to the semiquantitative score proposed by Goh et al. ILD extent <and >20% were considered mild and severe, respectively.