was developed, which showed excellent targeting of the folate receptor beta on activated macrophages in synovial tissue in a preclinical arthritic rat model (3).

Objectives: To assess the value of [^{18}F]fluoro-PEG-folate PET-CT for imaging inflamed joints in patients with clinically active RA.

Methods: Nine RA patients with at least two clinically inflamed hand joints were included. PET-CT scans of the hands were acquired after intravenous administration of either 185 MBq of [^{18}F]fluoro-PEG-folate ($n=6$) or 425 MBq of (R)-[^{11}C]PK11195 ($n=3$). Volumes of Interest (VOI) were drawn over joints with visually marked uptake and Standardized Uptake Values (SUVs) were calculated. Background VOIs were drawn on metacarpal bone in order to calculate Target-to-Background (T/B) ratios.

Results: No side effects were observed, establishing the safety of [^{18}F]fluoro-PEG-folate for use in humans. [^{18}F]fluoro-PEG-folate clearly showed uptake in arthritic joints, as shown in Figure 1. In patients scanned with [^{18}F]fluoro-PEG-folate, 25 positive joints were seen, with a minimum of two joints per patient. Clinical arthritis was confirmed in 10 of these 25 joints, and was absent in 15 positive joints, suggesting the presence of subclinical inflammation. Whilst both [^{18}F]fluoro-PEG-folate and (R)-[^{11}C]PK11195 accumulated in arthritic joints, [^{18}F]fluoro-PEG-folate showed a significantly lower background uptake than (R)-[^{11}C]PK11195 (SUV of 0.18 vs 0.75; $p<0.001$) respectively. T/B-ratios were significantly higher for [^{18}F]fluoro-PEG-folate (3.60vs 1.72, $p=0.009$).

Conclusions: This first in patient study clearly demonstrates the potential of [^{18}F]fluoro-PEG-folate PET-CT as macrophage tracer to image both clinically and sub-clinically affected joints in RA patients. [^{18}F]fluoro-PEG-folate showed better characteristics for arthritis imaging than the established tracer (R)-[^{11}C]PK11195 because of its lower background signal.

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SAT0651 QUANTIFICATION OF DYNAMIC MRI EXAMINATIONS IN JUVENILE IDIOPATHIC ARTHRITIS

N. Tzaribachev¹, R. Hagoug², P. Louka², J. Islam², M. Hinton², O. Kubassova², M. Boesen³. ¹Pri - Pediatric Rheumatology Research Institute, Bad Bramstedt, Germany; ²Image Analysis Group, London, United Kingdom; ³Radiology, Copenhagen University Hospital Bispebjerg and Frederiksberg, Bispebjerg, Denmark

Background: In chronic inflammatory conditions, the need for a more objective measurement of disease activity has been identified. Imaging biomarkers as outcome measurements based on the automated quantification of dynamic contrast enhanced magnetic resonance images (DCE-MRI) have been studied in adult patients with rheumatoid arthritis (RA)¹. In children with juvenile idiopathic arthritis (JIA) similar knowledge is very limited.

Objectives: To compare treatment related changes of clinical scores in patients with JIA and automated DCE-MRI quantitative parameters analyzed with a dedicated software Dynamikatm also compared to clinical outcomes of the patients.

Methods: In patients with polyarticular JIA with insufficient (≥ 3 affected joints) response or intolerance to ≥ 3 months Methotrexate, Etanercept was started. Six Slice Axial DCE-MRI of the metacarpophalangeal (MCP) 2–5 joints in the clinically most affected hand was performed at 3 time points: baseline (BL), month 3 and 6 of treatment using a 0.2 Tesla Esaote C-Scan. Clinical scores included active joint (AJ) counts. Clinical response was considered a state of ≤ 3 AJ. DCE-MRI was analyzed using regions of interest (ROI) covering synovium in slices where MCPs 2–5 were visible. Output parameters included dynamic MRI quantification scores (DEMRIQvol) corresponding to the volume of enhancing voxels within the synovial ROIs alone or multiplied with the mean of the maximum enhancement (ME) or the initial rate of enhancement (IRE). Differences in DEMRIQvol scores between visits were analyzed using t-test ($p<0.05^*$ = statistically significant, $p<0.25^{**}$ = clinically meaningful). Concordance between clinical and DEMRIQvol scores were described.

Results: 18 Caucasian patients (12 girls, median age 12.6 years, median disease duration 1.2 years) were included in the study. Two patients discontinued imaging after BL but continued treatment. In all but 3 of the remaining patients statistically significant and/or clinically meaningful changes were documented for DEMRIQvol ME between visits.

In 4 patients clinical and DEMRIQvol scores showed corresponded changes but these were non-concordant in all others patients.

Based on DEMRIQvol change (irrespective of the clinical scores) the outcome of the patient could be predicted:

- in 5 patients improvement of DEMRIQvol scores predicted response to treatment (within 2–6 months after last MRI examination)
- in 4 patients the increase or the persistence of a high DEMRIQvol predicted non-response to treatment
- in 7 patients increase in DEMRIQvol (after initial decrease) or persistence of a high DEMRIQvol predicted flare (in 3 of the patients flare occurred after treatment discontinuation)

In all patients subclinical disease could be detected on MRI in clinically unaffected joints.

Conclusions: Dynamika based scores appear to be useful for depicting disease activity in JIA and seem to support clinical examination by detecting subclinical inflammation. More over, in the present study DEMRIQvol scores were predictive for the outcome of the patients and were able to “foresee” response to treatment, flare of disease, non-response to treatment in most patients possibly making DEMRIQvol scores supportive in research and clinical decision taking.

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SAT0652 CLINICAL AND IMMUNOLOGICAL SIGNIFICANCE OF RADIOGRAPHIC THYMIC ALTERATIONS IN PATIENTS WITH RHEUMATOID ARTHRITIS

O. Murata¹, K. Suzuki¹, H. Sugiura², Y. Kondo¹, M. Takeshita¹, H. Yasuoka¹, K. Yamaoka¹, K. Koga³, R. Morita⁴, A. Yoshimura⁴, T. Takeuchi¹. ¹Division of Rheumatology, Department of Internal Medicine, School of Medicine; ²Division of Diagnostic Radiology, Department of Radiology, School of Medicine, Keio University, Tokyo; ³Inflammation Drug Discovery Unit, Pharmaceutical Research Division, Takeda Pharmaceutical Company Limited, Kanagawa; ⁴Department of Microbiology and Immunology, School of Medicine, Keio University, Tokyo, Japan

Background: The thymus, a primary lymphoid organ, plays a crucial role in immune system homeostasis [1,2]. Although several small-scale studies of the association between radiographic thymus alterations and serological features have been reported in systemic autoimmune diseases, information in patients with rheumatoid arthritis (RA) is limited.

Objectives: We conducted a large-scale cross-sectional analysis of radiographic thymus alterations and their association with clinical and immunological features in patients with RA.

Methods: RA patients were randomly selected from all patients who visited our department and underwent chest CT scan between January 2013 and December 2015. Patients with thymoma or thymic cyst and those aged less than 30 years were excluded. Thymic enlargement and thymus attenuation score in axial images of CT scans were quantitatively interpreted. We defined thymic enlargement as a thickness of more than 13 mm and graded the score by a four-point scale (score 0–3) according to previous studies [3,4]. Associations with immunophenotyping data of peripheral blood by flow cytometry and clinical and serological information were statistically analyzed in some available patients.

Results: 387 RA patients were enrolled. 78% were women and mean age was 65.2 ± 12.3 years. Thymic enlargement was found in 76 (19.6%) patients. Thymus attenuation (score ≥ 2) was found in 154 (39.8%) patients. These findings were more frequent than in undiagnosed controls (11.3% ($P=0.078$) and 22.5% ($P=0.017$)). Importantly, radiographic thymus alterations in these RA patients, especially thymus attenuation score, were significantly associated with serological features such as serum level of CRP, ESR, IgG, RF-positivity or ACPA-positivity ($P=0.0003$, 0.001 , 0.0009 , 0.005 , and 0.0009 respectively). When we investigated the association with the proportion of 68 peripheral blood subpopulations in 83 RA patients, thymic enlargement was significantly associated with the proportions of CD45RA+CCR7+ naive CD4+T cell or CD45RO+CCR7-effector memory CD4+T cell ($P=0.04$ and 0.009). Furthermore, thymus attenuation score was also significantly associated with the proportions of CD4+ naive T cell, CD4+effector memory T cell, CXCR5-CXCR3+CXCR6+CD4+Th1/Th17 cell, CD45RO-CCR7+CD95+CD4+ stem cell memory T cell, and CD19+ B cell ($P=0.03$, 0.02 , 0.04 , 0.04 , and 0.037 respectively).

Conclusions: Radiographic thymus alterations are frequent in RA patients and may reflect immunological features of autoantibody production or T cell differentiation and function.

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SAT0653 QUANTITATIVE ASSESSMENT OF INTERSTITIAL LUNG DISEASE IN SJÖGREN SYNDROME: A PILOT STUDY

P. Guisado Vasco¹, M. Silva², N. Sverzellati², I. Martín Garrido¹, D. Santilli³, F. Mozzani³, O. Martín Segarra¹, J.M. Luque Pinilla¹, A. Ariani⁴. ¹Internal Medicine, Complejo Hospitalario Ruber Juan Bravo, Madrid, Spain; ²Radiology, University of Parma; ³Internal Medicine; ⁴Internal Medicine and Rheumatology unit, UAzienda Ospedaliero-Universitaria di Parma/University of Parma, Parma, Italy

Background: The interstitial lung disease (ILD) is the most frequent form of lung damage in Sjögren's syndrome (SjS). The diagnosis is still nowadays challenging: there are not specific test - autoantibodies, pulmonary function test- or symptoms. Chest CT is the gold standard. Semiquantitative (SQCT) assessment (such Taouli or Goh visual scores) could estimate ILD severity or burdened by relevant inter-rater variability. Quantitative chest CT (QCT) is a promising method to assess primary or secondary ILD, but there are not studies focused on SjS-ILD.

Objectives: Herein we designed a study to evaluate if QCT indexes might assess differences in SjS-ILD.

Methods: We conducted a multicenter, cross-sectional, and retrospective study, identifying subjects affected of SjS (per modified American-European consensus criteria) and with a thorax CT ordered by local physician by any reason. We enrolled 52 cases, splitted in two cohorts according to the presence/absence of ILD on chest CT. A centralized SQCT assessment was carried out to calculate both Goh and Taouli scores. A DICOM-viewer open-source software (Horos) was used to analyse, blindly and anonymously, all CT images and to calculate QCT indexes (pulmonary (p) and total (t) kurtosis, standard deviation, skewness and mean lung attenuation). QCT indexes and SQCT scores were compared using the Spearman rank and Mann-Whitney tests. ROC curves were calculated to assess the sensibility and specificity of the QCT indexes to detect ILD.

Results: Median age was 70.5 (95% CI 65.47–73.0); 96.2% were female. 9 cases have ILD, and 41 were not affected - two patients not assessable. The disease duration (till CT thorax) have a median of 21 (95% CI -6 – 42.41) months. 42.3% have secondary SjS and 57.7% a primary SjS. All QCT scores, except tSDev, were statistically different in ILD comparing those without ILD; the most relevant were: pKurt 2.05 (IQR 0.389 – 3.78) vs 4.34 (IQR 2.74– 6.0), p=0.008; pSdev (105.6 (IQR 101.4 – 122.95) vs 96.4 (IQR 92.38 to 104.94), p=0.006); pSkew (1.49 (IQR 0.49 -1.94) vs 2.01 (IQR 1.59 – 2.38), p=0.011); tKurt 7.62 (IQR 3.35 – 9.31) vs 10.00 (IQR 8.60 – 11.42), p=0.012 and tSkew 2.52 (1.63 – 2.85) vs 3.04 (2.81– 3.29), p=0.005. ROC analysis showed that tSkew could best discriminate ILD and those without: 0.8 (95% CI 0.66–0.9), cut off point ≤2.89; sensitivity 88.89% (95% CI 51.8–99.7), specificity 65.85% (95% CI 49.4–79.9), p<0.001. The correlation coefficients for QCT and Goh and Taouli's score ranges around ±0.4.

Conclusions: QCT indexes identified some differences between SjS-ILD and those not. These parameters could be useful both to improve imaging diagnosis and also the decision to treat those cases. This innovative tool might open up a potential research area to be developed in SjS. Moreover, the operator independence of QCT makes it a time-saving method extremely suitable for multi-centre trials. Our pilot study have some handicaps: small sample, low number of events, different reasons for CT performing, no smoking identification, and biological differences between primary and secondary SjS. However, it could be point out that QCT could be a useful tool to identify and quantify ILD in SjS, and further data are need to ascertain this hypothesis.

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SAT0654 THE RECALL SURVEY: DIFFERENCES OF ULTRASOUND EXAMINATION BETWEEN EARLY VS LONG LASTING RHEUMATOID ARTHRITIS PATIENTS IN CLINICAL REMISSION

P. Macchioni¹, A. Iagnocco², M. Canzoni³, C. Bonali⁴, O.M. Epis⁵, E. Filippucci⁶, A. Delle Sedie⁷, S. Tropea⁸. ¹Rheumatology, Arcispedale S Maria Nuova, Reggio Emilia; ²Academic Rheumatology Unit, Università degli Studi di Torino, Turin; ³Rheumatology, Local Health Unit (ASL) Rome 1, Rome; ⁴Rheumatology, Ospedale San Paolo, Bari; ⁵Rheumatology, Ospedale Niguarda Milano, Milan; ⁶Rheumatology, Università Politecnica delle Marche, Jesi (AN); ⁷Rheumatology, Università di Pisa, Pisa; ⁸Rheumatology, Busacca Hospital, Ragusa, Italy

Background: Ultrasound (US) examination is able to show subclinical synovitis and structural changes of joints in patients (pts) with RA in clinical remission (CR).

Objectives: To investigate the differences of US examinations of small joints of hands, feet and wrists in pts with very early (VERA, <1y) vs early (ERA, <3y duration) vs long lasting RA (LRA, >7 y duration) in clinical remission (CR).

Methods: In 2015 an educational event (RECALL survey) focused on the added value of US in RA pts was held in 22 rheumatology centers in Italy. In every center, the local rheumatologists provided RA pts to be examined by US. Pts signed an informed consent and a brief history of them was collected by the local rheumatologists (previous and current therapy, DAS28, HAQ score). Bilateral US examinations of wrists, metacarpophalangeal (MCP) and metatarsophalangeal

(MTP) joints were performed by rheumatologists expert in US, to assess synovitis (joint effusion, synovial proliferation, and power Doppler (PD) signal), and bone erosions, using a Logiq E R7, General Electrics, with a 4.2–13 MHz linear probe. All US findings were scored using a 4 degree semiquantitative scoring system.

Results: Eighty-eight pts were classified as VERA, 183 as ERA and 165 as LRA. Drug usage was not different among the three groups of pts. LRA patients were older (p<0.001), had longer disease remission before US examination (p<0.001) and had an higher prevalence of female sex (p<0.01). Table 1 reports the differences of US examination between VERA vs ERA vs LRA patients. LRA patients had more erosions at MTP and wrists with no differences at MCP joints. Synovial hypertrophy and PD signal had the same degree and distribution in the two groups of patients. LRA patients had more MTP joints with effusion with lower degree as compared to patients with ERA and VERA (see table 1).

Table 1

	VERA (A) 88 pts	VERA+ERA 183 pts	LRA (C) 165 pts	p
M/F	25/63	58/125	22/143	A vs C = 0.002 B vs C = <0.001
Number of pts aged <50y	30/88	58/183	21/165	A vs C = <0.001 B vs C = <0.001
% of pts with remission <12 months	85	80	48	A vs C = <0.001 B vs C = <0.001
% of pts with >1 eroded joint	39	54	62	A vs C = <0.001 B vs C = <0.001
% of pts with >1 joint with synovial hypertrophy	69	71	73	A vs C = ns B vs C = ns
% of pts with synovial hypertrophy >1	46	49	51	A vs C = ns B vs C = ns
% of pts with >1 joint positive for PD signal	48	50	45	A vs C = ns B vs C = ns
% of joints with PD signal >1	32	34	35	A vs C = ns B vs C = ns
% of pts with effusion at MTP joints	45	49	59	A vs C = 0.034 B vs C = 0.044
% of pts with MTP joints effusion >1	25	21	12	A vs C = 0.010 B vs C = 0.023

Conclusions: At US examination VERA, ERA and LRA pts in CR have the same degree of synovial hyperplasia and PD signal despite the differences of duration of CR. Higher degree of erosive disease (at wrist and MTP joints), lower degree of MTP effusion and higher prevalence of joint effusion at MTP joints were present among LRA vs ERA and VERA pts.

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SAT0655 EARLY ENDOTHELIAL DAMAGE IN PATIENTS WITH RAYNAUD'S PHENOMENON

R. Gualtierotti^{1,2}, F. Ingegnoli^{2,3}, T. Schioppo², S. Griffini^{4,5}, E. Grovetti^{4,5}, M.O. Borghi⁶, M. Cugno^{4,5}, P.L. Meroni^{1,2,3,6}. ¹Lupus Clinic; ²Division of Rheumatology; ASST G. Pini; ³Department of Clinical Sciences and Community Health; ⁴Dipartimento di Fisiopatologia Medico-Chirurgica e dei Trapianti, University of Milan; ⁵Medicina Interna, Ospedale Maggiore Policlinico, Fondazione IRCCS Ca' Granda; ⁶IRCCS Istituto Auxologico Italiano, Milan, Italy

Background: Raynaud's phenomenon (RP) can be the first manifestation of systemic sclerosis (SSc) or other connective tissue diseases (CTDs), often preceding an overt disease by years. It is not known if markers of endothelial damage are detectable in those RP patients who subsequently develop a CTD.

Objectives: We studied RP patients at their first evaluation to correlate the levels of endothelial markers with the subsequent development of an overt disease 36 months later.

Methods: Eighty-two patients with RP at their first evaluation were recruited. We measured plasma levels of tissue-type plasminogen activator (t-PA) and von Willebrand factor (vWF), two markers of endothelial damage, and interleukin-6 (IL-6), a pro-inflammatory cytokine. Thirty healthy subjects served as healthy controls.

Results: At baseline, 67 patients showed capillaroscopic normal pattern and 15 patients, of which 11 were very early SSc, had scleroderma pattern. Plasma levels of t-PA, vWF and IL-6 were higher in patients with capillaroscopic normal pattern (p=0.0001) than in normal controls and even much higher in patients with scleroderma pattern (p=0.0001). In patients with capillaroscopic normal pattern and RP of recent onset (<18 months), vWF plasma levels were higher when autoantibodies were present (p=0.020). After 36 months, among 48 RP patients with capillaroscopic normal pattern who remained in follow-up, 24 were diagnosed as primary and 24 as secondary RP. In secondary RP, basal levels of t-PA, IL-6 and particularly vWF were higher than in primary RP (p=0.005, p=0.004, p=0.0001 respectively) and normal controls (p=0.0001 for all).

Conclusions: Our findings indicate that markers of endothelial damage are elevated in RP patients who subsequently develop SSc or other CTDs, even in the absence of capillaroscopic abnormalities.

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