doppler (PD) was assessed for each joint (score from 0 to 3). Inflammation was defined as the presence of SH> 1 or PD> 0. Machine learning was used to classify patients with RA, PA, UA and SA with inflammation evidenced by ultrasound and healthy subjects from thermographic images. The evaluation of the classifier was performed by leave-one-out cross-validation and the area under the ROC curve (AUCROC) in those subjects whose thermal image was performed with the Thermal Expert TE-Q1 camera. The study was approved by the Clinical Ethics and Research Committee of the centers.

Results: 500 subjects were recruited from March 2018 to January 2020, of these 73 were excluded due to poor quality in the thermal image (moved or absence of temperature contrast between hand and background). Of the 427 subjects analyzed, 129 corresponded to healthy subjects, 138 to patients without evidence of inflammation and 160 to patients with inflammation evidenced by ultrasound (116 RA and 44 PA, UA or SA). Of these, 42% were taken using the Thermal Expert TE-Q1 camera. An AUCROC of 0.73 (p-value <0.01) was obtained for the healthy classifier vs RA and 0.72 (p-value <0.01) for the healthy classifier vs PA, UA and SA.

Conclusion: A classification model has been developed capable of differentiating patients with RA, PA, UA and SA with evidence of inflammation from healthy subjects. These results open an opportunity to develop tools that facilitate early diagnosis.

References:

- Barhamain AS, Magliha RF, Shaheen MH, Munassar SF, Falemban AM, Alshareef MM, Almoallim HM. The journey of rheumatoid arthritis patients: a review of reported lag times from the onset of symptoms. *Open Access Rheumatol*. 2017 Jul 28;9:139-150. doi: 10.2147/OARRR.S138830. eCollection 2017. Review.
- Lynch CJ, Liston C. New machine-learning technologies for computer-aided diagnosis. *Nat Med*. 2018 Sep;24(9):1304-1305. doi: 10.1038/s41591-018-0178-4.
- Brenner M, Braun C, Oster M, Gulko PS. Thermal signature analysis as a novel method for evaluating inflammatory arthritis activity. *Ann Rheum Dis*. 2006 Mar;65(3):306-11.

Disclosure of Interests: None declared

DOI: 10.1136/annrheumdis-2020-eular.4760

SAT0568

PERSISTENT VASCULAR 18F-FDG UPTAKE DESPITE CLINICAL-ANALYTICAL REMISSION IN PATIENTS WITH LARGE VESSEL VASCULITIS UNDER TOCILIZUMAB THERAPY. SINGLE UNIVERSITY CENTER EXPERIENCE OF 30 PATIENTS.

D. Prieto-Peña¹, M. Calderón-Goercke¹, I. Martínez-Rodríguez¹, J. I. Banzo¹, J. García-Fernández¹, P. Vicente-Gómez¹, M. A. González-Gay¹, R. Blanco¹.

¹Marqués de Valdecilla University Hospital, Santander, Spain

Background: Tocilizumab (TCZ) has shown efficacy in large vessel vasculitis (LVV) (1-3). Disease activity assessed by laboratory markers (ESR,CRP) may be of less value with TCZ. ¹⁸F-FDG PET/CT may be useful to monitor LVV disease activity (4-5).

Objectives: To assess a) evolution of disease activity in LVV treated with TCZ by PET/CT and b) its correlation with clinical/serological markers.

Methods: Single centre study of 30 patients with refractory LVV treated with TCZ who had a baseline and follow-up PET/CT scan. Vascular uptake was assessed quantitatively and qualitatively. Quantitative analysis was assessed as a target to background ratio (TBR)=SUVmax thoracic aorta/SUVmax aortic vascular pool. For qualitative analysis, FDG uptake at vessel wall was visually grading compared to the liver. We defined a total vascular score which included 5 vascular areas (supra aortic trunks, thoracic, abdominal, iliac and femorotibial arteries) ranging from 0 to 15. Clinical improvement (no improvement/partial/complete), analytical (CRP mg/dL; ESR mm/^{1st} hour) and reduction of prednisone dose (mg/day) were also assessed.

Results: 30 patients (24 w/6 m); mean age 65.3 ± 10.6 yrs. TCZ was started after 6.5 [2.0-20.0] months from LVV diagnosis. Most patients received TCZ as intravenous infusions (70%) and almost half of them (46.7%) received combined therapy with MTX. Clinical/analytical evolution and quantitative/qualitative uptake assessment is shown in **TABLE**. After a mean follow-up of 37.0±18.5 months, 92.3% of patients experienced complete clinical/analytical improvement. Complete quantitative normalization of vascular uptake (TBR< 1.34) was achieved in 30.8%. Qualitatively, 23.1% of patients showed normalization (total vascular score =0) at the end of the study period.

Conclusion: Most patients with LVV under TCZ experienced rapid and effective clinical and analytical response. Decrease of vascular uptake was also observed both quantitatively and qualitatively assessed. However, complete normalization of vascular uptake despite clinical remission was only observed in less than one-third of patients.

TABLE.

	Basal (n=30)	6 months (n=9)	12-18 months (n=21)	>18 months (n=13)
Clinical improvement				
Complete, n (%)		7 (77.8)	16 (76.2)	12 (92.3)
Laboratory markers				
ESR (mm/1st), median [IQR]	24.0 [9.8-53.0]	2.0 [2.0-3.0] *	2.0 [2.0-4.0] *	2.0 [2.0-3.5] *
CRP (mg/dL), median [IQR]	1.5 [0.5-2.4]	0.1 [0.1-0.2] *	0.1 [0.1-0.1] *	0.1 [0.1-0.1] *
ESR/CRP normalization, n (%)		9 (100)	21 (100)	13 (100)
FDG vascular uptake				
TBR, mean ± SD	1.69 ± 0.52	1.56±0.41 *	1.46±0.16 *	1.40 ± 0.18 *
Total vascular score, mean ± SD	5.0 ± 2.6	3.7 ± 2.2	3.3 ± 1.7 *	2.7 ± 2.4 *
Quantitative normalization, n (%)		4 (44.4)	5 (23.8)	4 (30.8)
Qualitative normalization, n (%)		1 (11.1)	1 (4.8)	3 (23.1)

*test Wilcoxon: p < 0.05. Quantitative normalization when TBR <1.34. Qualitative normalization when total vascular score =0.

References:

- Calderón-Goercke M et al. Tocilizumab in giant cell arteritis. Observational, open-label multicenter study of 134 patients in clinical practice. *Semin Arthritis Rheum*. 2019 Aug; 49(1):126-135. doi: 10.1016/j.semarthrit.2019.01.003.
- Loricera et al. Tocilizumab in patients with Takayasu arteritis: a retrospective study and literature review. *Clin Exp Rheumatol*. 2016 May-Jun;34(3 Suppl 97): S44-53.
- González-Gay MA et al. Current and emerging diagnosis tools and therapeutics for giant cell arteritis. *Expert Rev Clin Immunol*. 2018 Jul;14(7):593-605. doi: 10.1080/1744666X.2018.1485491.
- Martínez-Rodríguez et al. (18)F-FDG PET/CT in the follow-up of large-vessel vasculitis: A study of 37 consecutive patients. *Semin Arthritis Rheum*. 2018 Feb;47(4):530-537. doi: 10.1016/j.semarthrit.2017.08.009.
- Loricera et al. Non-infectious aortitis: a report of 32 cases from a single tertiary centre in a 4-year period and literature review. *Clin Exp Rheumatol*. 2015 Mar-Apr; 33(2 Suppl 89): S-19-31.

Disclosure of Interests: D. Prieto-Peña: None declared, Monica Calderón-Goercke: None declared, Isabel Martínez-Rodríguez: None declared, Jose Ignacio Banzo: None declared, Javier García-Fernández: None declared, Patricia Vicente-Gómez: None declared, Miguel A González-Gay Grant/research support from: Pfizer, Abbvie, MSD, Speakers bureau: Pfizer, Abbvie, MSD, Ricardo Blanco Grant/research support from: AbbVie, MSD, Roche, Consultant of: AbbVie, Eli Lilly, Pfizer, Roche, Bristol-Myers, Janssen, UCB Pharma and MSD, Speakers bureau: AbbVie, Eli Lilly, Pfizer, Roche, Bristol-Myers, Janssen, UCB Pharma, MSD

DOI: 10.1136/annrheumdis-2020-eular.1628

SAT0569

"IMAGES ARE MORE THAN PICTURES, THEY ARE DATA" [1] – EXPLORATION OF RADIOMICS ANALYSIS FOR SYSTEMIC SCLEROSIS-ASSOCIATED INTERSTITIAL LUNG DISEASE

J. Schniering¹, M. Maciukiewicz¹, H. Gabrys², M. Brunner¹, C. Blüthgen³, O. Distler¹, M. Guckenberger², T. Frauenfelder³, S. Tanadini-Lang², B. Maurer¹.

¹Center of Experimental Rheumatology, Department of Rheumatology, University Hospital Zurich, Zurich, Switzerland; ²Department of Radiation Oncology, University Hospital Zurich, Zurich, Switzerland; ³Institute of Diagnostic and Interventional Radiology, University Hospital Zurich, Zurich, Switzerland

Background: Interstitial lung disease (ILD) affects 60% of patients with systemic sclerosis (SSc) and is the primary cause of death. Medical imaging is an integral part of the routine work-up for diagnosis and monitoring of SSc-ILD and includes high-resolution computed tomography (HRCT). Radiomics is a novel research area that describes the in-depth analysis of tissue phenotypes in medical images with computational retrieval of quantitative, mineable metadata appropriate for statistical analyses.

Objectives: To explore the performance of HRCT-derived radiomic features for the assessment of SSc-associated ILD (i.e. diagnosis, staging, and lung function).

Methods: Radiomics analysis was performed on HRCT scans from 98 SSc patients, including n=33 SSc patients without ILD, n=33 with limited and n=32 with extensive ILD as defined by 0%, <20% and ≥20% visual extent of fibrosis on HRCT, respectively. Following semi-automated segmentation of lung tissue on 3D reconstructed HRCT scans, 1386 radiomic features, including 17 intensity, 137 texture, and 1232 wavelet features were extracted using the in-house developed software Z-Rad (Python 2.7). In order to identify robust features, we conducted intra- and inter-reader correlation analysis (ICC) in a subgroup of patients. Only features with good reproducibility (ICC ≥ 0.75) entered subsequent analyses. We applied the Wilcoxon test, followed by Receiver Operating Characteristic (ROC) curve analyses, to identify features significantly different between a) ILD

and non-ILD and b) limited vs. extensive ILD patients. Spearman rank correlation was performed to reveal significant associations of radiomic features from a) and b) with lung function as measured by percentage of predicted forced vital capacity (FVC% predicted).

Results: In total, 1355/1386 radiomic features passed the test of robustness and were eligible for further, exploratory analyses. Radiomic features with good performance (area under the ROC curve (AUC) ≥ 0.7 and p -value ≤ 0.05) were considered as potential candidate discriminators. Under this criterion, we identified 288/1355 (21.3%) radiomic features that were significantly different between ILD and non-ILD patients and 409/1355 (30.2%) features that significantly discriminated between limited and extensive ILD (Fig. 1). For diagnosis, the texture feature *dependence count entropy* was the top parameter to distinguish ILD patients from healthy controls (AUC = 0.89, $p = 1.83 \times 10^{-10}$), whereas for staging the wavelet feature *HHH long run high grey level emphasis* proved to be best suited to separate limited from extensive ILD (AUC = 0.88, $p = 7.76 \times 10^{-9}$).

Fig 1.

Correlation analysis of the most significant (best performing) discriminative radiomic features with lung function revealed a significant negative correlation of *dependence count entropy* ($\rho = -0.51$, $p = 9.89 \times 10^{-8}$) and *HHH long run high grey level emphasis* ($\rho = -0.51$, $p = 1.73 \times 10^{-9}$) with FVC% predicted.

Conclusion: Our study adds novelty to the field of SSc-ILD showing that radiomic features have great potential as quantitative imaging biomarkers for diagnosis and staging of SSc-ILD and that they may reflect lung function. As the next step, we are planning to build predictive models, using machine learning, for diagnosis, staging, and lung function and validate them in external patient cohorts. If validated such models will pave the way for computer-aided management in SSc-ILD and thus improve patients' outcome.

References:

[1] Gillies, R. J., Kinahan, P. E. & Hricak, H. Radiomics: Images Are More than Pictures, They Are Data. *Radiology* 278, 563-577, doi:10.1148/radiol.2015151169 (2016).

Disclosure of Interests: Janine Schniering: None declared, Malgorzata Maciukiewicz: None declared, Hubert Gabrys: None declared, Matthias Brunner: None declared, Christian Blüthgen: None declared, Oliver Distler Grant/research support from: Grants/Research support from Actelion, Bayer, Boehringer Ingelheim, Competitive Drug Development International Ltd. and Mitsubishi Tanabe; he also holds the issued Patent on mir-29 for the treatment of systemic sclerosis (US8247389, EP2331143)., Consultant of: Consultancy fees from Actelion, Acceleron Pharma, AnaMar, Bayer, Baeon Discovery, Blade Therapeutics, Boehringer, CSL Behring, Catenion, ChemomAb, Curzion Pharmaceuticals, Ergonex, Galapagos NV, GSK, Glenmark Pharmaceuticals, Inventiva, Italfarmaco, iQvia, medac, Medscape, Mitsubishi Tanabe Pharma, MSD, Roche, Sanofi and UCB, Speakers bureau: Speaker fees from Actelion, Bayer, Boehringer Ingelheim, Medscape, Pfizer and Roche, Matthias Guckenberger: None declared, Thomas Frauenfelder: None declared, Stephanie Tanadini-Lang: None declared, Britta Maurer Grant/research support from: AbbVie, Protagen, Novartis, congress support from Pfizer, Roche, Actelion, and MSD, Speakers bureau: Novartis

DOI: 10.1136/annrheumdis-2020-eular.928

SAT0570

CLINICAL SIGNIFICANCE OF FINGER EXTENSOR PARATENONITIS DETECTED BY MUSCULOSKELETAL ULTRASOUND

T. Suzuki¹, H. Shirai¹. ¹Japanese Red Cross Medical Center, Division of Allergy and Rheumatology, Tokyo, Japan

Background: The extensor tendons over fingers are devoid of a tendon sheath, so that the term paratenonitis is used to describe extra-articular hyperemia or anechoic fluid collections along the extensor tendons of the fingers. Although the

grading of paratenonitis is found in one sonographic scoring system of RA known as German US7, the clinical significance of paratenonitis is not fully understood. **Objectives:** To determine the clinical significance of finger extensor paratenonitis detected by ultrasound (US), especially in the patients with RA.

Methods: We reviewed 1200 reports of the US examination underwent in our division since April 2015. The items necessary for scoring US5 scores (the 'hand-limited version' of the German US7) have been routinely recorded. The cases with finger extensor paratenonitis over the dorsal metacarpophalangeal joint (MCPJ) were determined. The severity of articular synovitis in the perilesional MCPJ were subjectively graded for grey-scale (GS) and power Doppler (PD) on a four-step scale (0-3) and scored using EULAR-OMERACT combined scoring system. In RA patients, US5 scores were determined for the involved hands.

Results: Paratenonitis was found in 44 fingers in the 38 hands of the 36 patients with rheumatic diseases/disorders including 25 patients with RA (11 early RA and 14 established RA). Non-RA diseases/disorders included 4 cases of undifferentiated arthritis, 2 cases of PsA, 1 case each of SLE, Sjogren syndrome, reactive arthritis and other disorders.

Figure 1

The 44 fingers were classified according to the absence or presence of articular synovitis in the perilesional MCPJ into "isolated paratenonitis" or "paratenonitis accompanied by synovitis". The distribution of paratenonitis over the 1st-5th fingers of the dominant or non-dominant hands is shown in Figure 1. Paratenonitis was relatively frequently found in the 3rd and 2nd fingers of the dominant hands. Interestingly, articular synovitis in the perilesional MCPJ were found significantly more frequent in the cases of MCP2 in the dominant hands (73%) than in the cases of MCP3 in the dominant hands (25%) ($p=0.039$).

Figure 2

Among the 27 hands with paratenonitis of 25 RA patients, US5 scores were compared based on the absence or presence of moderate to severe articular synovitis in the perilesional MCPJ (the combined score >1) (Figure 2). GS synovitis score, PD synovitis score and PD tenosynovitis score were significantly higher in those with moderate to severe perilesional MCPJ synovitis than in those without it ($p=0.007$, 0.0092 and 0.0458 , respectively).

Conclusion: Finger extensor paratenonitis over the dorsal MCPJ tends to occur in the 3rd and 2nd fingers of the dominant hand. In RA patients, paratenonitis accompanied by active perilesional MCPJ synovitis are presumably due to active disease, while isolated paratenonitis can also be caused possibly by degenerative changes due to overuse or deformity. Isolated paratenonitis may be more frequently found in the 3rd finger than in the 2nd finger of the dominant hand.