increased in RDC type 2 compared with type 1 and DDH. Increased posterior pelvic tilt was found in RDC type 2 compared with DDH. Logistic regression and receiver operating characteristic curve analyses indicated that MMP-3 may be associated with differentiation between RDC types 1 and 2. No difference was found in CTI between RDC types and DDH.

RDC type 2 hips developed partial (type 2A) and massive (type 2B) femoral head destruction within the first 12 months. Whereas partial destruction showed <20% collapse ratio, massive destruction demonstrated >40% collapse ratio. Increased posterior pelvic tilt was found in massive destruction. Femoral head destruction started earlier within the first 6 months in massive destruction compared with that in partial destruction. From receiver operating characteristic curve analysis, pelvic tilt differentiated the femoral head destruction types using the initial radiograph at the onset before first demonstration of femoral head destruction. No difference was found in CTI or MMP-3 between the two subtypes.

Conclusion: Disease progression of RDC during 12 months after the onset of hip pain could be classified into two distinct types based on the absence (type 1) and presence (type 2) of femoral head destruction in association with MMP-3 and pelvic tilt as biological and mechanical factors, respectively. MMP-3 may be helpful to differentiate those two types in the early stage of RPOH. The extent of femoral head destruction could further differentiate RDC type 2 into two subtypes based on pelvic tilt.

Acknowledgments : This study was supported by the Japan Hip Joint Foundation.

Disclosure of Interests: None declared

DOI: 10.1136/annrheumdis-2020-eular.347

AB1138

ASSESSMENT OF FLUORESCENCE-OPTICAL IMAGING TECHNIQUE OF THE HANDS IN PSORIASIS AND PSORIATIC PATIENTS USING AN INNOVATIVE OBJECTIVE METHOD

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Background: Psoriasis (Pso) is one of the most common chronic inflammatory skin diseases in Europe. Psoriatic arthritis (PsA) is closely associated to Pso whereas the skin manifestation appears usually years before PsA-related symptoms emerge. Up to 30% of Pso patients develop PsA, biomarkers for its early detection are of major importance. In early PsA, changes in synovial vascularisation appear first. Imaging biomarkers for detection of changes in vascularisation might be useful for early detection of musculoskeletal disease. Fluorescence-optical imaging (FOI) is a new method to detect changes in microvascularisation of the hands. Each collected data set of the FOI system contains 360 images representing a time progression of the indocyanine green (ICG) distribution.

Objectives: To evaluate a reader-independent assessment method for evaluation of FOI in patients with PsO and PsA.

Methods: A prospective study including patients with dermatological confirmed skin PsO was performed. 411 patients were included from German dermatology units without PsA diagnosis but potential risk for its development. Clinical examination (CE) was performed by a qualified rheumatologist. For a reader independent evaluation of the FOI images an objective joint-based scoring method was developed. For this method, the joint areas are defined by image segmentation and scored based on generated heatmaps. To calculate a heatmap indicating conspicuous joints from a data set containing 360 images, each pixel is converted to a time series containing 360 values. From this time series, three independent values (features) are extracted: amplitude, average value and maximal slope. Thus, each pixel is reduced to three different feature values. After the three features are determined for each pixel, k-means clustering is performed on each feature. The numbers of centroids (k) are set to 3, 5, 7 and 9. 12 heatmaps (3 features $\times$ 4 ks) are calculated, which results in 12 scores for each joint as well. The clusters are then sorted dependent on their centroid value and coloured accordingly to a predefined heatmap colour palette. To finally score each joint, the pixels in the segmented joint area and their assigned cluster are summed and normalized by the area's amount of pixels and k.

Results: 271 of the patients were investigated by the newly developed method and compared with the CE scoring. 6426 joints were labeled as healthy whereas 1162 joints were either labeled as swollen, tender or both. The result over all investigated patients for k = 9 is summed in table 1. It is observable that every average and median healthy value is lower than the corresponding affected value.

Table 1. Resulting scores for k = 9 for all 271 patients.

Feature	Amplitude		Mean		Slope	
	Healthy	Affected	Healthy	Affected	Healthy	Affected
Average	0.503	0.528	0.486	0.509	0.395	0.414
Median	0.496	0.532	0.482	0.505	0.389	0.415

Conclusion: FOI is an innovative method that detects early changes in vascularization of the hands. So, this method can be useful in early detection of arthritis especially in risk populations such as PsO patients. The results of the objective scoring method show that a clear distinction between healthy and affected joints is possible with the average scores as well as the median values. However, if the range of the scores is considered, the overlap between healthy and affected is not neglectable. Thus, the current scoring system can be used as an indicator but not as a single classification marker. Nevertheless, the research at hand has shown the expected outcome and motivates further development on the heatmap approach.

Disclosure of Interests: Lukas Zerweck: None declared, Ulf Henkemeier: None declared, Phuong-Ha Nguyen: None declared, Tanja Rossmannith Grant/research support from: Janssen, BMS, LEO, Pfizer, Andreas Pippow: None declared, Harald Burkhardt Grant/research support from: Pfizer, Roche, Abbvie, Consultant of: Sanofi, Pfizer, Roche, Abbvie, Boehringer Ingelheim, UCB, Eli Lilly, Chugai, Bristol Myer Scripps, Janssen, and Novartis, Speakers bureau: Sanofi, Pfizer, Roche, Abbvie, Boehringer Ingelheim, UCB, Eli Lilly, Chugai, Bristol Myer Scripps, Janssen, and Novartis, Frank Behrens Grant/research support from: Pfizer, Janssen, Chugai, Celgene, Lilly and Roche, Consultant of: Pfizer, AbbVie, Sanofi, Lilly, Novartis, Genzyme, Boehringer, Janssen, MSD, Celgene, Roche and Chugai, Michaela Köhm Grant/research support from: Pfizer, Janssen, BMS, LEO, Consultant of: BMS, Pfizer, Speakers bureau: Pfizer, BMS, Janssen, Novartis
DOI: 10.1136/annrheumdis-2020-eular.5371

AB1139

DIAGNOSTIC AND PROGNOSTIC SIGNIFICANCE OF CHEST CT EVALUATION OF SMALL PULMONARY VESSELS IN CONNECTIVE TISSUE DISEASES WITH PULMONARY ARTERIAL HYPERTENSION.

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Background: Pulmonary arterial hypertension (PAH) is a fatal complication of connective tissue diseases (CTDs). Chest CT has been increasingly used in the evaluation of patients with suspected PH noninvasively but there is a paucity of studies.

Objectives: Our study was aimed to investigate the cross-sectional area (CSA) of small pulmonary vessels on chest CT for the diagnosis and prognosis of CTD-PAH.

Methods: This retrospective study analyzed the data of thirty-four patients with CTD-PAH who were diagnosed by right heart catheterization (RHC) and underwent chest CT between March 2011 and October 2019. We measured the percentage of total CSA of vessels <5mm² and 5-10mm² as a percentage of total lung area (%CSA_{<5} and %CSA₅₋₁₀) on Chest CT. Furthermore, the association of %CSA with mean pulmonary artery pressure (mPAP) was also investigated. Besides, these patients were followed up until October 2019, and Kaplan-Meier survival curves were generated for the evaluation of prognosis.

Results: Patients with CTD-PAH had significantly higher %CSA₅₋₁₀ than CTD-nPAH (p=0.001), %CSA₅₋₁₀ in CTD-S-PAH and IPAH was significantly higher than CTD-LM-PAH and COPD-PH (p<0.01). There was a positive correlation between %CSA₅₋₁₀ and mPAP in CTD-PAH (r=0.447, p=0.008). Considering %CSA₅₋₁₀ above 0.38 as a threshold level, the sensitivity and specificity were found to be 0.824 and 0.706, respectively. Patients with %CSA₅₋₁₀ $\geq$ 0.38 had a lower survival rate than those with %CSA₅₋₁₀ < 0.38 (p=0.049).

Conclusion: Quantitative parameter, %CSA₅₋₁₀ on Chest CT might serve a crucial differential diagnostic tool for different types of PH. %CSA₅₋₁₀ $\geq$ 0.38 is a prognostic indicator for evaluation of CTD-PAH.

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Acknowledgments: Thanks to all patients involved in this retrospective study. Thanks go to every participant who participated in this study for their enduring efforts in working with participants to complete the study. Thanks to Liangmin Wei for helping us with statistics analysis.

Disclosure of Interests: None declared

DOI: 10.1136/annrheumdis-2020-eular.3063

AB1140

ABNORMAL RIGHT VENTRICLE RESERVE FOLLOWING EXERCISE IN PATIENTS WITH CONNECTIVE TISSUE DISEASES

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Background: Recent studies have indicated that cardiac autonomic dysfunction is an early sign of cardiovascular impairment in patients with connective tissue disease (CTD). Previous studies have mainly focused on autonomic regulation during rest in this population. The cardiac autonomic responses to an acute physiological stress might provide additional information on the autonomic dysfunction, serving as a powerful predictor of cardiovascular disease and mortality in patients with CTD.

Objectives: We aimed to use exercise stress echocardiography to detect early right heart dysfunction in patients with CTD and healthy controls.

Methods: Treadmill exercise stress echocardiography was performed in 19 CTD patients (8 systemic sclerosis, 6 mixed CTD and 5 SLE) and 20 healthy volunteers. Parameters of right ventricular (RV) systolic function (RV fractional area change, Doppler tissue s' velocity, and systolic strain and strain rate) and diastolic function (peak E and A velocity, Doppler tissue e', a' and early and late diastolic strain rate) were evaluated at baseline and after exercise, with the difference (Δ) being systolic and diastolic reserve. The immunoblotting assay was performed to detect the levels of rheumatoid factor (RF) and C-reactive protein (CRP) as well as autoantibodies such as, antinuclear antibody (ANA), anti-U1 ribonucleoproteins (U1RNP), anti-dsDNA, anti-Sm, anti-SSA, anti-SSB, anti-SCL-70 and RO-52. The correlation between these proteins and RV function was analyzed.

Results: Both the patients with CTD and healthy controls had a normal range of BMI, total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), and triglyceride (TG). The average age of patients with CTD was 46.0 ± 10.4 years. At baseline, these patients presented no cardiovascular disease or pulmonary hypertension. No significant difference in the body weight, height, age, sex, blood pressure, RV and left ventricular (LV) function at rest between the two groups (all $P > 0.05$). The parameters of RV systolic reserve decreased significantly in CTD group compared to those of the healthy controls ($\Delta s'$: 5.8 ± 2.1 vs $8.3 \pm 2.5 \text{ cm}^{-1}$, $P < 0.01$; Δs_r : 2.5 ± 0.8 vs $2.8 \pm 0.7 \text{ s}^{-1}$, $P < 0.01$). Consistently, RV diastolic reserve was significantly decreased in CTD patients compared to controls ($\Delta e'$: 2.8 ± 1.5 vs $3.9 \pm 2.3 \text{ cm}^{-1}$, $P < 0.05$; $\Delta a'$: 5.8 ± 2.5 vs $10.9 \pm 6.3 \text{ cm}^{-1}$, $P < 0.05$; $\Delta E-s_r$: 0.8 ± 0.2 vs $1.2 \pm 0.5 \text{ s}^{-1}$, $P < 0.05$; $\Delta A-s_r$: 0.9 ± 0.3 vs $1.3 \pm 0.6 \text{ s}^{-1}$, $P < 0.05$). To identify independent predictors of RV function in CTD patients, linear regression was conducted. This suggested that ANA, anti-U1RNP, anti-dsDNA, anti-Sm, anti-SSA, anti-SSB, anti-SCL-70 and RO-52 were not correlated with RV reserve (all $P > 0.05$). A logistic regression analysis revealed that RF ($P < 0.05$) and CRP ($P < 0.01$) were independently associated with RV reserve in CTD patients in response to an acute physiological stress.

Conclusion: Treadmill exercise echocardiography could detect right heart dysfunction early before diagnosed as cardiovascular diseases in patients with CTD. RV reserve after exercise might be a promising parameter to detect cardiovascular disease early in CTD patients.

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Disclosure of Interests: None declared

DOI: 10.1136/annrheumdis-2020-eular.1549

Public health, health services research, and health economics

AB1141

EVALUATION OF INFLUENZA AND PNEUMOCOCCAL VACCINATION RATES IN PATIENTS WITH RHEUMATOID ARTHRITIS AND SPONDYLOARTHRITIS, AND THE AWARENESS OF RHEUMATOLOGISTS ABOUT VACCINATION

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Background: Patients with inflammatory arthritis have increased risk of infections which may lead to morbidity and mortality. Some of those infections could be prevented by vaccination.

Objectives: The main objectives of the present study were to investigate (a) the uptake rate of influenza and pneumococcal vaccination among patients with rheumatoid arthritis (RA) and spondyloarthritis (SpA) attending a rheumatology outpatient clinic, (b) the factors associated with their vaccination rate and, (c) the attitudes of Turkish rheumatologists about vaccination.

Methods: Patients, followed-up in a tertiary rheumatology outpatient clinic with the diagnosis of RA and SpA, volunteered for participating to study, were included in this cross-sectional study. Data regarding the socio-demographic and disease-related characteristics (including disease duration, medications used, and comorbid conditions) of the patients, vaccination history, the knowledge about the vaccination, and the factors potentially associated with the uptake of vaccination were collected by face-to-face interview using a standardized questionnaire. 102 out of 345 rheumatologists have participated in a web-based survey.

Results: In total, we collected data from 387 patients (260 with SpA and 114 with RA; 204 [52.8%] female and mean age 46.6 ± 12.7 years). Only 123 (32.3%) of our patients were responded that their disease or treatment might be related to the increased risk for infectious diseases. Influenza and pneumococcal vaccines were administered to 71 (21.4%) and 21 (6.1%) patients, respectively. Vaccination for influenza was recommended by family physicians in 26 patients and by rheumatologists in 12 patients. Rate of influenza vaccination was significantly higher in patients > 65 years ($p = 0.021$) and with any co-morbid conditions ($p = 0.002$). The main reasons reported by patients regarding not to be vaccination were (a) the belief that they did not need the vaccine (49.4% for influenza and 26.2% for pneumococcal vaccine), (b) the absence of recommendation from their physicians (24.1% for influenza and 26.2% for pneumococcal vaccine), (c) fear of adverse event of vaccination (28.8% for influenza and 3.2% for pneumococcal vaccine), and (d) lack of knowledge about vaccination (6.1% for influenza and 12.5% for pneumococcal vaccine). Even though 50% of rheumatologists who responded to the survey were aware of the presence of national vaccination recommendations, all of them stated that patients with inflammatory arthritis need to be vaccinated for both influenza and pneumococcal infections. Influenza and pneumococcal vaccines were administered to 23 (22.5%) and 4 (3.9%) rheumatologists, respectively.

Conclusion: Although the knowledge and awareness about influenza and pneumococcal vaccinations were seemed to be high among rheumatologists, vaccination rates for both were insufficient in RA and SpA patients. There remains significant effort to improve vaccination rates and to prevent morbidity and mortality due to vaccine-preventable infections in inflammatory rheumatic diseases.

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