initially randomized to UPA: 81% (95% CI, 72%–89%) in the as-observed analysis and 70% (61%–80%) in the NRI analysis achieved ASAS40 at wk 64 (Figure). Similar results were observed for other efficacy endpoints (Figure). Among all 182 pts receiving UPA, 618 AEs were reported. AEs leading to discontinuation and serious AEs were low (Table). No serious infections, active tuberculosis, venous thromboembolic events, gastrointestinal perforation, major adverse cardiovascular events, renal dysfunction, or deaths were reported.

Table 1. TEAEs per 100 PYs

Events/(E/100 PY)	UPA 15 mg QD N=182 (237.6 PY)
Any AE	618 (260.1)
Serious AE	14 (5.9)
AE leading to discontinuation	15 (6.3)
Infections	205 (86.3)
Opportunistic infection*	2 (0.8)
Herpes zoster†	5 (2.1)
Creatine phosphokinase elevation‡	28 (11.8)
Hepatic disorder§	24 (10.1)
Neutropenia‖	7 (2.9)
Anemia‖	3 (1.3)
Lymphopenia‖	2 (0.8)
Malignancy¶	1 (0.4)
Death	0

AE, adverse event; PY, patient-year; QD, once daily; TEAE, treatment-emergent AE; UPA, upadacitinib.*Two non-serious events of esophageal candidiasis in the same patient.†Five events in 4 patients; all non-serious and limited to 1 dermatome.‡All events were non-serious and none led to study drug discontinuation; majority were asymptomatic.§Majority based on asymptomatic alanine aminotransferase/aspartate aminotransferase elevations; all were non-serious and none led to study drug discontinuation.‖All events were non-serious and none led to study drug discontinuation.¶Squamous cell carcinoma of tongue in 61-year-old male former smoker; no reasonable possibility to be study drug related per investigator.

Conclusion: UPA 15 mg QD showed sustained and consistent efficacy over 1 year. Pts who switched from placebo to UPA at wk 14 showed a similar efficacy response compared with pts who received continuous UPA. No new safety findings were observed compared with safety data from the UPA clinical development program in other indications.[2]

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Diagnostics and imaging procedures

OP0145

DIFFERENTIAL DIAGNOSIS OF RA AND PSA USING NEURAL NETWORKS ON THREE-DIMENSIONAL BONE SHAPE OF FINGER JOINTS

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Background: Early diagnosis and reliable differentiation between rheumatic diseases (RMDs) are crucial to start an adequate therapy and prevent irreversible damage. Since finger joints are commonly affected in rheumatoid arthritis (RA) and psoriatic arthritis (PsA), imaging of the peripheral skeleton is an essential step of diagnosis at a rheumatologist. High resolution peripheral quantitative computed tomography (HR-pQCT) allows an even more detailed and three-dimensional (3D) illustration of the peripheral bone than conventional radiographs. Segmented scans contain further information, such as the density, microstructure, and shape of the bones, which can be further analyzed by neural networks.
Objectives: We hypothesize that, based on the shape of the second metacarpophalangeal (MCP) joint from HR-pQCT images, a neural network can be trained to differentiate between RA, PsA, and healthy controls and to reveal regions in the bone shape characteristic for the diseases.
Methods: HR-pQCT images of MCP joints from patients with classified CCP positive RA, classified PsA, and healthy controls with low motion artifacts and appropriate scan region were selected as reported previously [3]. Scans were performed as part of the clinical routine and patients gave their informed consent to use pseudonymized data (Ethics approval 334_16B). Based on the assumption that pathognomonic changes develop over time, only images were used, where the period between classification and imaging exceeded one year.
Based on previous work [4], a pixel-wise mask of the second metacarpal bone was generated using a neural network based on the HR-pQCT scans of patients. Supervised auto-encoder [1] networks were used to predict the correct class given the bone mask only. For the neural network experiment, the patient scans were split on a patient-level into training (70%), validation (20%), and testing (10%). Guided backpropagation [2] was used as a method to investigate the regions influencing the class prediction most.
Results: In total, images of 331 patients were included in the experiments. The evaluation of the model on the 33 test cases yielded a high accuracy for the healthy control with 94%, RA patients with 84%, and PsA patients with 89%. An area under the receiver operator curve of 91% could be achieved. The regions of the bone mask influencing the network´s decision most are highlighted exemplary in Figure 1.

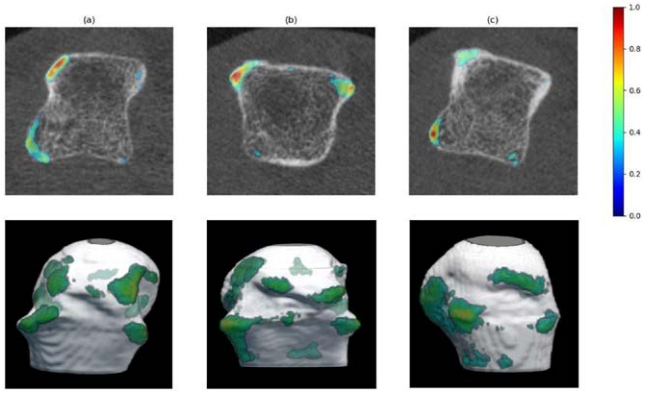

Figure 1. Visualization of the HR-pQCT slices with gradient maps. Higher values (red) represent regions that had a stronger contribution to the classification result. The HR-pQCT images are displayed for reference only. (a) Healthy patient, (b) RA diagnosed patient, and (c) PsA diagnosed patient. The first row shows the single slices with the highest values corresponding to the 3D bone masks in the second row.

Conclusion: For the first time, a neural network-based approach successfully provides a differential diagnosis of RA and PsA based only on the shape of the second MCP in HR-pQCT images. The evaluation of the test set suggests that high curvatures of the bone surface in the joint region significantly influence the prediction of the network, suggesting an in-depth investigation of these regions

for patients affected by RA and PsA. Based on these promising findings, we aim to extend the approach to seronegative RA as well as early RA and PsA.

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OP0146 TENOSYNOVITIS, SYNOVIAL HYPERTROPHY AND FEET BURSITIS ARE USEFUL ULTRASOUND BIOMARKERS FOR PREDICTING ARTHRITIS DEVELOPMENT IN A POPULATION AT-RISK FOR RHEUMATOID ARTHRITIS

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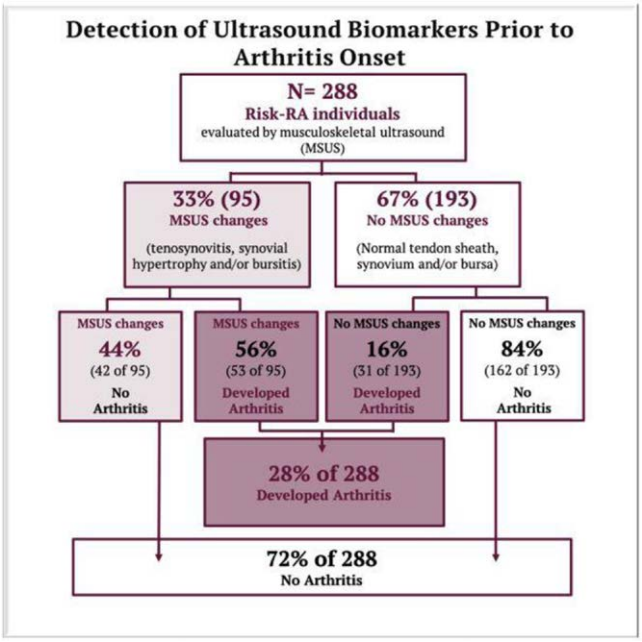
Background: Musculoskeletal ultrasound (MSUS) evaluation of individuals at risk for developing rheumatoid arthritis (RA) having Anti-Citrullinated Protein Antibody (ACPA) positivity and musculoskeletal complaints, may play an important role in the very early detection of RA.
Objectives: We aimed to identify which ultrasound markers could predict arthritis development.
Methods: Individuals with musculoskeletal complaints with a positive anti-CCP2 test were referred to the rheumatology department for a detailed clinical (68 joint count) and MSUS examination of the hands, feet and any symptomatic joints. Only those without clinical and/or MSUS detected arthritis were included in the RISK RA prospective cohort and followed-up over 3 years/ or until arthritis onset. Using EULAR-OMERACT guidelines[1], MSUS markers for synovial hypertrophy (SH) and hyperemia (Doppler activity) were documented for each visit. Finger and wrist tendons were screened for any signs of tenosynovitis (TS), and between metatarsal joints for bursitis. Association of MSUS biomarkers with arthritis development was tested (comparing proportions) using Chi-Squared or Fisher's exact tests.
Results: 288 individuals were included from January 2014 to October 2019 (79% female, 35% RF positive, median age 48 years: IQR: 36-58). Within a median of 38 months (IQR: 1-72) since recruitment, 84 individuals (28%) developed an arthritis diagnosis.
Prior to obtaining any diagnosis (at inclusion and/or follow-up visit), 95 of the 288 individuals (33%) had at least one type of MSUS anatomical modification present (around the tendons, joint synovium and/or within bursal cavities), and 56% (53/95) of these individuals eventually developed arthritis. Of the remaining 193 that did not present with any obvious MSUS changes, 16% progressed towards arthritis development.
The presence of tenosynovitis was detected in 64 of 288 individuals scanned prior to diagnosis and were more frequent in those developing arthritis (44%, 37/84) as compared to those with TS not developing arthritis (13%, 27/204), p<0.0001. The extensor carpi ulnaris wrist tendons were mostly involved. Sonographic changes within the synovium were noted in 11% (32/288) of all individuals, mostly affecting the metacarpophalangeal (MCP) and metatarsophalangeal (MTP) joints. There was a higher incidence of synovial hypertrophy detected in those developing arthritis (22%, 18/24), as compared to those that remained arthritis free (7%, 14/204), p<0.0001. The MCP joints with synovial hypertrophy were more prone to arthritis development as compared to the MTP's. Furthermore, we observed a higher frequency of bursitis between the MTP joints in individuals developing arthritis, as compared to individuals having a bursitis who did not develop arthritis (13%, 11/84 versus 7%, 14/204, p=0.009).



Conclusion: Ultrasound biomarkers such as tenosynovitis of the extensor carpi ulnaris, synovial hypertrophy of the MCP joints and feet bursitis have good potential to predict arthritis development in a population at-risk for rheumatoid arthritis.

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OP0147 RHEUMATIC? - A DIGITAL DIAGNOSTIC DECISION SUPPORT TOOL FOR INDIVIDUALS SUSPECTING RHEUMATIC DISEASES: A MULTICENTER VALIDATION STUDY

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Background: Digital diagnostic decision support tools promise to accelerate diagnosis and increase health care efficiency in rheumatology. *Rheumatic?* is an online tool developed by specialists in rheumatology and general medicine together with patients and patient organizations for individuals suspecting a rheumatic disease.[1,2] The tool can be used by people suspicious for rheumatic diseases resulting in individual advise on eventually seeking further health care.
Objectives: We tested *Rheumatic?* for its ability to differentiate symptoms from immune-mediated diseases from other rheumatic and musculoskeletal complaints and disorders in patients visiting rheumatology clinics.