1. Bridging SIN and Andersson lesion were detected in 1/12 (8.3%) and 2/12 (16.7%) of PsO patients versus 17/35 (48.6%) and 8/35 (22.9%) of PsA patients, respectively. In 15/22 (68%) of those with normal CR, 7/9 (77.7%) of those with only SI in CR, 5/5 (100%) of those with SI and SIN in CR, 11/11 (100%) of those with only SIN in CR were found to have syndesmophyte on ldCT. Accordingly, 38/47 (80.8%) patients had at least one syndesmophyte on ldCT (Table 1).

Conclusion: When PsO and PsA patients with non-specific axial symptoms were evaluated with spinal ldCT, new syndesmophytes were found in a significant proportion of patients (2/3 of patients with only PsO), additionally an increased distribution of syndesmophytes was observed. The thoracic vertebra is one of the most frequently involved area in psoriatic disease similar with SpA. Comparative studies with a healthy control group are needed to determine the potential role of ldCT.

REFERENCES:
[1] De Bruin, F. et al. Ann. Rheum Dis 2018; 77:371–377.
[2] De Koning A et al. Ann Rheum Dis 2018; 77:293–299

Table 1. Distribution of SIN detected by ldCT

	All patients n=47	Only SI* n=9	SI and SIN n=5	Only SIN** n=11	SI and SIN negative n=22
C2-L5 at least on one vertebrae	38 (80.9)	7 (77.8)	5 (100)	11 (100)	15 (68.2)
C2-L5 at least on two region***	28 (59.6)	5 (55.6)	5 (100)	10 (90.9)	8 (36.4)
C2-L5 at least on three region***	10 (21.3)	1 (11.1)	1 (20)	7 (63.6)	1 (4.5)
C2-C7 at least on one vertebrae	19 (40.4)	3 (33.3)	2 (40.0)	10 (90.9)	4 (18.2)
C2-C7 at least on two vertebrae	7 (14.9)	0	1 (20)	6 (54.5)	0
T1-T12 at least on one vertebrae	37(78.7)	7 (77.8)	5 (100)	10 (90.9)	15 (68.2)
T1-T12 at least on two vertebrae	34 (72.3)	7 (77.8)	5 (100)	10 (90.9)	12 (54.5)
T1-T12 at least on three vertebrae	24 (51.1)	4 (44.4)	5 (100)	8 (72.7)	7 (31.8)
L1-L5 at least on one vertebrae	20 (42.6)	3 (33.3)	4 (80)	7 (63.6)	6 (27.3)
L1-L5 at least on two vertebrae	14 (29.8)	3(33.3)	4 (80)	5 (45.5)	2 (9.1)

*SI: Sacroiliitis**Syndesmophyte***Region: either cervical or thoracic or lumbar
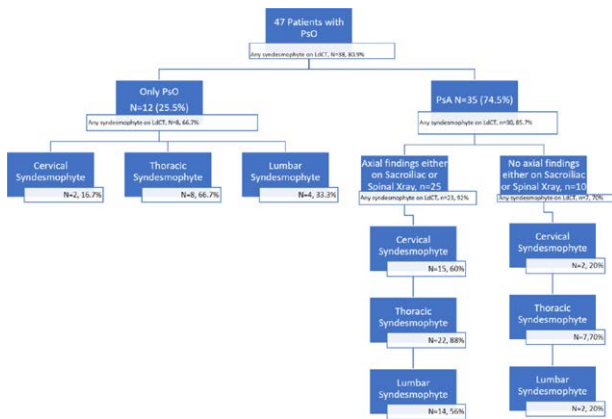
Figure 1. Distribution of ldCT findings with CR results

POS0925 **AUTOMATIC SCORING OF ULTRASOUND SYNOVIAL HYPERTROPHY IN RHEUMATOID ARTHRITIS THROUGH INTEGRATING MULTIPLE CONVOLUTIONAL NEURAL NETWORK MODELS**

Keywords: Rheumatoid arthritis, Artificial intelligence, Ultrasound

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Background: The OMERACT-EULAR Synovitis Scoring (OESS) system is worldwide used to evaluate arthritis severity on ultrasound (US) images. Because of inter-observer and intra-observer variability, deep learning (DL) has been applied in high-quality image interpretation and analysis. Previous studies mostly focused on Doppler US (DUS) classification by convolutional neural network (CNN), which could provide objective assessment. However, the reports of DL intervention in grey scale (GS) US image automatic measurements are limited.

Objectives: The aim of this study was to develop an integrated multiple CNN model in precise scoring GS US images from rheumatoid arthritis (RA) patients.

Methods: The standard US images from patients of RA were retrospectively selected by three 10-years US experienced rheumatologist together and were graded according to the OESS system. Six different joints data were taken, including proximal interphalangeal, metacarpophalangeal, wrist, elbow, knee and ankle joints. We conducted the DL model integrating three binary CNNs to predict four-class GS US scoring (Figure 1). The accuracy of the trained model was tested by an independent test data.

Results: Total 678 images from 447 patients of RA were used in this study. These images were divided into training (n=611) and testing (n=67) sets. The integrated multiple CNNs model could achieve a four-class accuracy of 77.6%. The individual accuracy of grades 0, 1, 2 and 3 were 68.4%, 77.3%, 73.3% and 100%, respectively (Table 1). Furthermore, we found that adding on anatomic site parameters or labeling areas of interest would establish a better average area under curve (AUC) with 92.6% and 89.0%.

Conclusion: Our study suggests the possibility of using the integrated multiple CNNs model in grading synovial hypertrophy of RA, which is critical in RA healthcare. External validation would be required to confirm the predictive ability of this model.

REFERENCES:
[1] D'Agostino MA et al. RMD Open. 2017 Jul 11;3(1):e000428.
[2] Andersen JKH et al. RMD Open. 2019 Mar 30;5(1):e000891.
[3] Christensen ABH et al. Ann Rheum Dis. 2020 Sep;79(9):1189-1193.
[4] Shin Y et al. Ultrasonography. 2021 Jan;40(1):30-44.
[5] Zhou Z et al. Patterns (N Y). 2022 Sep 29;3(10):100592.
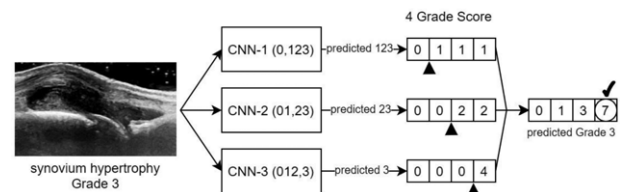
Figure 1. The proposed integrated multiple CNNs model to predict grade 3 synovium hypertrophy in rheumatoid arthritis. CNN: convolutional neural network.

Table 1. Prediction results of the integrated model for grey scale ultrasound scores

	Integrated model					Accuracy
Rheumatologist	0	1	2	3	Total	(%)
0	13	4	2	0	19	68.4
1	4	17	1	0	22	77.3
2	1	2	11	1	15	73.3
3	0	0	0	11	11	100
Total	18	23	14	12	67	77.6

POS0926 **OPTICAL SPECTRAL TRANSMISSION IN THE DIAGNOSIS OF HAND OSTEOARTHRITIS: CLINICAL ASSOCIATIONS AND EVALUATION OF A NEW DIAGNOSTIC ALGORITHM INCLUDING ALL FINGER JOINTS**

Keywords: Osteoarthritis, Imaging

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Background: Optical spectral transmission (OST) is a modern diagnostic technology able to quantify joint inflammation in a non-invasive; rapid and examiner-independent manner [1-3]. The vast majority of studies on OST have been performed in patients with rheumatoid arthritis (RA) [1-3]. No sufficient data on the diagnostic value of OST regarding other arthropathies have been published. However, our study group and others could show that concomitant to RA joint pathologies, such as primary or secondary (post-arthritic) osteoarthritis (OA) could have an influencing effect on OST results [1,4].

Objectives: Aim of this study was therefore to investigate the performance of OST in the diagnosis of OA and to evaluate its ability to identify activated OA changes.