Figure:

Figure – Illness Perception Questionnaire items over 12 months, stratified by the latent profiles [10 represents worst illness perception]

B-IPQ1: How much does arthritis affect your life?
 B-IPQ2: How long do you think your arthritis will continue?
 B-IPQ3: How much control do you feel you have over your arthritis? (reverse coded)
 B-IPQ4: How much do you think your treatment can help your arthritis? (reverse coded)
 B-IPQ5: How much do you experience symptoms from your illness? (reverse coded)
 B-IPQ6: How concerned are you about your arthritis?
 B-IPQ7: How well do you feel you understand your arthritis? (reverse coded)
 B-IPQ8: How much does your arthritis affect you emotionally?

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SAT0039

ADAPTIVE DEEP LEARNING FOR THE PREDICTION OF INDIVIDUAL DISEASE ACTIVITY IN PATIENTS WITH RHEUMATOID ARTHRITIS

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Background: Rheumatoid arthritis (RA) lacks reliable biomarkers that predict disease evolution on an individual basis, potentially leading to over- and under-treatment. Deep neural networks learn from former experiences on a large scale and can be used to predict future events as a potential tool for personalized clinical assistance.

Objectives: To investigate deep learning for the prediction of individual disease activity in RA.

Methods: Demographic and disease characteristics from over 9500 patients with 65.000 visits from the Swiss Quality Management (SCQM) database were used to train and evaluate an adaptive recurrent neural network (AdaptiveNet). Patient and disease characteristics along with clinical and patient reported outcomes, laboratory values and medication were used as input features. DAS28-BSR was used to predict active disease and future numeric individual disease activity by classification and regression, respectively.

Results: AdaptiveNet predicted active disease defined as DAS28-BSR>2.6 at the next visit, with an overall accuracy of 75.6% and a sensitivity and specificity

of 84.2% and 61.5%, respectively. Apart from DAS28-BSR, the most influential characteristics to predict disease activity were joint pain, disease duration, age and medication. Longer disease duration, age >50 or antibody positivity marginally improved prediction performance. Regression allowed forecasting individual DAS28-BSR values with a mean squared error of 0.9.

Conclusion: Deep neural networks have the capacity to predict individual disease outcome in RA. Low specificity remains challenging and might benefit from alternative input data or outcome targets.

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Figure 1. Examples of true disease activity and corresponding predictions of AdaptiveNet by regression analysis. Predictions are made step to step from the current to next visit.

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SAT0040

RISK FACTORS FOR DEVELOPING AND MORTALITY FOR ACUTE EXACERBATION OF RHEUMATOID ARTHRITIS-ASSOCIATED INTERSTITIAL LUNG DISEASE

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Background: Among collagen vascular diseases, rheumatoid arthritis-associated interstitial lung disease (RA-ILD) is the most commonly associated with ILD with acute exacerbation (AE) [1]. One study reported that ILD diagnosis at an older age, the usual interstitial pneumonia (UIP) pattern on high-resolution computed tomography, and methotrexate (MTX) use were associated with AE in patients with RA-ILD [2]. However, because these studies included few patients, the risk factors and prognosis of AE in patients with RA-ILD remain unclear.

Therefore, this study examined the characteristics of RA-ILD patients with AE, and the variables associated with mortality due to AE of RA-ILD.

Objectives: To investigate the risk factors for AE and mortality of RA-ILD.

Methods: We retrospectively collected the clinical data of 165 RA-ILD patients admitted to our hospital between July 2010 and October 2019. We compared clinical characteristics between patients who developed AE (AE group) and those who did not (non-AE group), and identified the variables significantly associated with AE occurrence. We also compared the admission characteristics of those who survived (survivor group) and those who died (non-survivor group) after admission for AE. AE was defined using previously proposed criteria [3], which were modified slightly for application to RA-ILD.

Results: The mean patient age was 73.6 ± 9.7 years and 97 (71.9%) patients were female. Thirty (22.2%) patients developed AE, of whom thirteen (43.3%) died (mean follow-up, 64.9 months). In univariate analyses UIP pattern and MTX were not associated with AE. However, in multivariate analyses, UIP pattern was associated with AE (OR 2.68, 95% CI 1.10–6.52, $p=0.03$). Median age (70 vs. 80 years, $p=0.003$), non-use of MTX (70.6% vs. 23.1%, $p=0.025$), and C reactive protein level (median 9.38 vs. 18.12 mg/dL, $p=0.02$) on admission were significantly higher in patients who died of AE. In the Cox proportional hazard model, UIP pattern (HR 4.67, 95% CI 1.02–21.5, $p=0.048$) and non-use of MTX (HR 0.16, 95% CI 0.04–0.72, $p=0.016$) were associated with death.

Conclusion: Our data suggest that the UIP pattern is related to AE, and non-use of MTX and UIP pattern are related to death due to AE of RA-ILD.

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SAT0041

EFFECT OF INTRA-ARTICULAR GLUCOCORTICOID INJECTION ON RADIOGRAPHIC DAMAGE IN PATIENTS WITH RHEUMATOID ARTHRITIS

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Background: Intra-articular glucocorticoid injection (IAGI) has been used as part of a treat-to-target strategy in patients with rheumatoid arthritis (RA). However, recent studies revealed that repeated intra-articular triamcinolone injection into knees with osteoarthritis resulted in significant greater cartilage volume loss after two years. Limited knowledge exists about the long-term efficacy of IAGI in RA, assessed by radiographic changes.

Objectives: To investigate whether IAGI have an additional benefit on achieving remission or low disease activity (REM/LDA) after 3 month, and radiographic progression over the next two years. Additionally, we identified the factors associated with early achievement of REM/LDA and radiographic progression.

Methods: We performed a retrospective study of RA patients who had active arthritis in the hand or wrist joints and received IAGI adjunct to disease modifying anti-rheumatic drugs, compared with those never had received IAGI. Short-term efficacy was assessed by changes of disease activity score in 28 joints (DAS28) after 3 months and long-term efficacy by changes of Sharp score of hand radiographs (HSS) taken before and two years after the onset of active arthritis. The radiographic progression was defined as $\Delta\text{HSS}/\text{year} \geq 1.5$. Conditional logistic regression analysis was used to identify predictors for radiographic progression.

Results: We identified 116 RA patients who received IAGI on the hand or wrist joints and 102 IAGI-naïve patients. After 3 months after active arthritis, 61% patients treated with IAGI and 39% of IAGI naïve patients achieved low disease activity or remission ($P=0.009$). In the next two year, 45% of patients with IAGI and 34% of IAGI-naïve patients were radiographically progressed ($P=0.114$). The $\Delta\text{HSS}/\text{year}$ of patients received IAGI was 1.0 (Interquartile ranges [IQR], 0–3.8), while that of IAGI-naïve patients was 0 (IQR, 0–2.5) ($P=0.005$). After adjusting disease duration, baseline HSS and 3-month DAS28, IAGI and wrist joint involvement were associated with radiographic progression.

Conclusion: IAGI given in the hand and wrist joints of patients with RA were associated with short-term control of disease activity, however, long-term

structural damage in the subsequent two years. Wrist joint arthritis had higher potential for radiographic progression, which should be carefully monitored.

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SAT0042

PREDICTIVE VALUE OF IMMUNOLOGICAL AND IMAGING BIOMARKERS ON ACHIEVING REMISSION AT 6 MONTHS IN RHEUMATOID ARTHRITIS PATIENTS TREATED BY INTRAVENOUS BDMARDS

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Background: RA is the most prevalent chronic inflammatory rheumatism, responsible of functional impairment.

Objectives: To investigate the value of biological and imaging biomarkers on predicting DAS 28 remission at 6 months, in RA patients initiating IV bDMARD.

Methods: From 2008 to 2017, 317 RA patients fulfilling ACR 1987 and/or ACR-EULAR 2010 criteria for RA, initiated IV bDMARDs in our department of Rheumatology. Patients were excluded in cases of lack of information on disease activity assessment before and at 6 months of treatment and on immunological status and titers (ACPA, RF, ANA) at baseline. For patients receiving successive IV bDMARDs during this time period ($n=30$), a randomization permitted to select 1 treatment sequence. On 173 patients eligible to the study, 4 were lost to follow-up and 14 stopped treatment due to adverse events before 6 months. Clinical, biological and imaging (US and RX) data, were collected when available at treatment initiation. US examination was performed on 12 targeted joints (wrist, MCP2-3-5 and MTP2-3-5) with qualitative and quantitative evaluation on B mode and Power Doppler (PD) for synovitis, tenosynovitis and erosion. The modified Sharp/van der Heijde erosion score was performed by 2 independent readers blindly from clinical and US informations. Remission was defined by a DAS 28 < 2.6 at 6 months. Only variables with a $p<0.2$ in univariate analysis were included in the multivariate model.

Results: On 155 RA patients, 11 had a disease duration < 2 year, 44 (28.3%) were on first line of IV bDMARDs and 111 patients received at least one IV bDMARD (mean 2.5 (1.3)).

Table 1. Characteristics of the patients (n=155) at baseline

Variables	N (%)	Mean (SD)
Clinical characteristics		
Age (years)		54.8 (12.2)
Female	113 (72.9)	
Disease duration (months)		166.9 (118.8)
DAS 28		5.2 (1)
Treatments		
Corticosteroids / dose (mg/day)	99 (85.3)	10.9 (6)
Monotherapy	56 (36.1)	
IV bDMARD		
Abatacept	27 (17.4)	
Infliximab	11 (7.1)	
Rituximab	84 (54.2)	
Tocilizumab	33 (21.3)	
Immunology		
ACPA + /titer (IU)	132 (85.2)	618.5 (791.0)
RF + /titer (IU/ml)	114 (74.5)	184.7 (351.3)
ANA + / levels	87 (56.1)	1453 (3836)
Radiography		
Sharp's erosion score (n=110)		49.4 (46.2)
US		
Nb Erosion (n=95)		3.0 (2.3)
Nb B mode Synovitis (n=128)		6.0 (4.1)
Nb PD+ Synovitis (n=130)		4.8 (3.8)
Nb B mode Tenosynovitis (n=129)		1.6 (2)
Nb PD+ Tenosynovitis (n=129)		1.3 (2.1)

At 6 months, 33 patients (21.3%) were in remission. Predictive values of biomarkers are presented in table 2.