at baseline, were comparable between the ETN and PBO group. Mean compliance to the study medication at sixteen weeks was 72.1%. Longitudinal regression analysis over the first 16 weeks showed a trend towards a three times higher chance to achieve the ASAS20 response in the ETN compared to the PBO group (OR = 3.2, 95% CI [0.6;16.7] $p=0.18$) (Figure 1). No differences were observed in ASAS20 response at 24 weeks. A positive SPARCC score (SPARCC ≥ 2.5) of the SIJ was observed in the ETN and PBO group in 33.3% (13/39 patients) vs. 30.8% (12/39 patients) at baseline, 16.7% (6/36 patients) vs. 17.5% (7/40 patients) at 16 weeks and 21.9% (7/32 patients) vs. 20.0% (7/35 patients) at 24 weeks, respectively. Increased CRP-levels (CRP_UL $\geq 10.0\text{mg/L}$) nor a positive SPARCC score at baseline, had significant influence on the ASAS20 response at 16 weeks follow-up. The safety profile was consistent with what is known for ETN in AS.

Conclusion: Patients suspected of nr-xSpA with high disease activity showed a trend towards a three times higher chance to achieve the ASAS20 response in the ETN group, compared to the PBO group at 16 weeks, regardless of a raised CRP level or positive MRI-SIJ at baseline.

Figure:

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Rheumatoid arthritis - prognosis, predictors and outcome I

OP0111

RHEUMATOID ARTHRITIS SEROLOGIC PHENOTYPE AT DIAGNOSIS AND SUBSEQUENT RISK FOR PNEUMONIA IDENTIFIED USING MACHINE LEARNING APPROACHES

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Background: Patients with rheumatoid arthritis (RA) are at increased risk of serious infections, with considerable excess morbidity and mortality after pneumonia. RA-related autoantibodies such as anti-cyclic citrullinated peptide (CCP) and rheumatoid factor (RF) may be generated at inflamed pulmonary mucosa prior to clinical RA onset. Therefore, patients with seropositive RA may be at

increased risk for pneumonia after RA diagnosis due to subclinical pulmonary injury.

Objectives: We investigated whether seropositive RA was associated with increased pneumonia risk compared to seronegative RA.

Methods: We performed a retrospective cohort study among RA patients seen at a health care system in Boston, MA. RA patients were identified using a previously validated electronic health record (EHR) algorithm incorporating billing codes, natural language processing (NLP) of notes, medications, and laboratory results at 97% specificity¹. We constructed an incident RA cohort using NLP for the index date of initial mention of RA. All patients were required to have both CCP and RF data from clinical care to determine serologic RA phenotype. We used semi-supervised machine learning approaches to identify pneumonia using billing codes and terms extracted using NLP, with the Centers for Disease Control definition of pneumonia from medical record review as a gold standard. The area under the receiver operating curve (AUROC) for this billing code+NLP pneumonia algorithm was 0.94 compared to the standard rule-based pneumonia algorithm (billing code on inpatient discharge) AUROC of 0.86 ($p<0.001$). Smoking status was extracted using NLP methods. Other covariates, including a previous validated weighted RA multimorbidity score², were determined using structured EHR data. We used Cox regression to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for pneumonia adjusting for potential confounders.

Results: We analyzed a total of 4,110 patients with incident RA and both CCP/RF data available. Mean age at index date was 53.0 years (SD 14.8), 77.2% were female, and 79.8% were CCP+ or RF+. During 32,248 patient-years of follow-up (mean 7.8 years/patient), we identified 240 pneumonia cases. Patients with seropositive RA had a HR of 1.99 (95%CI 1.30-3.01, Table) for pneumonia compared to patients with seronegative RA, adjusted for age, sex, smoking, index year, ESR level, glucocorticoid use, DMARD use, and weighted RA multimorbidity score. While CCP+ RA (HR 1.91, 95%CI 1.23-2.97) and RF+ RA (HR 2.07, 95%CI 1.35-3.16) had increased pneumonia risk compared to seronegative RA, the CCP+RF- RA subgroup had no association with pneumonia (HR 0.67, 95%CI 0.23-1.93).

Conclusion: Patients with incident seropositive RA, particularly RF+ RA, had increased risk for pneumonia throughout the RA disease course that was not explained by measured confounders including smoking status, multimorbidity, medications, and ESR level. Further studies should investigate how RF+ may predispose RA patients to later develop pneumonia after clinical RA diagnosis.

Table. Hazard ratios for pneumonia by CCP and RF status among patients with incident RA (n=4,110).

	Pneumonia cases	Patient-years	Unadjusted HR (95%CI)	Multivariable HR (95%CI)	n in model
Seronegative (CCP- and RF-)	24	6,154.98	1.00 (Ref)	1.00 (Ref)	4,110
Seropositive (CCP+ or RF+)	216	26,092.60	2.15 (1.41-3.28)	1.99 (1.30-3.01)	
Seronegative (CCP- and RF-)	24	6,154.98	1.00 (Ref)	1.00 (Ref)	2,973
CCP+	136	17,225.63	2.05 (1.33-3.16)	1.91 (1.23-2.97)	
CCP-	104	15,021.95	1.00 (Ref)	1.00 (Ref)	4,110
CCP+	136	17,225.63	1.14 (0.88-1.48)	1.10 (0.84-1.43)	
Seronegative (CCP- and RF-)	24	6,154.98	1.00 (Ref)	1.00 (Ref)	3,909
RF+	212	24,560.64	2.25 (1.47-3.43)	2.07 (1.35-3.16)	
RF-	28	7,686.94	1.00 (Ref)	1.00 (Ref)	4,110
RF+	212	24,560.64	2.40 (1.62-3.57)	2.22 (1.50-3.30)	
CCP- and RF-	24	6,154.98	1.00 (Ref)	1.00 (Ref)	4,110
CCP+ and RF-	4	1,531.96	0.67 (0.23-1.94)	0.67 (0.23-1.93)	
CCP- and RF+	80	8,866.98	2.36 (1.50-3.73)	2.22 (1.40-3.52)	
CCP+ and RF+	132	15,693.67	2.18 (1.41-3.38)	2.00 (1.29-3.01)	

*Adjusted for age (continuous, years), sex (male, female), race (white, non-white), smoking status (never, past, current), index calendar year, ESR level (continuous, mm/hr), glucocorticoids (use, non-use), disease-modifying antirheumatic drug (use, non-use), weighted rheumatoid arthritis multimorbidity score (continuous).

CCP, cyclic citrullinated peptide; CI, confidence interval; ESR, erythrocyte sedimentation rate; HR, hazard ratio; RF, rheumatoid factor.

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