Figure. Multivariable GEE analyses show associations between parameters and outcomes A) DAPSA, B) ASDAS, and C) Clinical remission.

A) DAPSA	Beta	95% CI	8)	ASDAS			Beta	95% CI
Sex, male	-0.878	-2.991; 1.235		Sea, mak	1		-0.125	-0.386; 0.136
Age, years	0.052	-0.052; 0.156		Age, years			0.007	-0.004; 0.011
HLA-827 positivity	2.575	-5.203; 0.053		#21 pesitivity		1	-0.366	-0.715: -0.01
Symptom duration, years	0.329	-0.627: -0.031	1.5	Anation, years	1		0.009	-0.021;0.03
Psoriasis, history (yes vs no)	2.754	-0.03, 5.538	Patriasis, histo			100	0.233	-0.144.0.61
IBD, history (yes vs no)	-0.17	-1.091; 2.551		ry (yes vs mi			-0.617	-0.9680.24
Queits, history (yes vs mi)	-1.09	-4.026; 1.846	Uveita, histo				-0.121	-0.540; 0.303
Sheroid intake (yes vs.no)	3.559	1.278; 5.84		As (yes va no			0.281	0.062, 0.495
csDMARDs intuke (yes vs.ne)	0.394	-1.177; 1.965	CIDMARDI Inte				0.03	-0.152.0.212
The intake (yes vs no)	0.608	-1.901; 3.147	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	de (pes ve no		1	-0.005	-0.235; 0.224
ISAID intake score, points (0-190)	0.079	0.056: 0.103	207230				0.011	0.008.0.015
your research control of the second second			NSAID intake score.	points (0-100	5			
	C) Clinical remission			OR	95% CI			
	Sex, male			1.495	0.869; 2.572			
	Age, years			1.053	0.977; 1.031			
	HLA-827 positivity			1.424	0.745: 2.725			
	Bymptom duration, years-			1,142	1.049; 1.243			
	Psonasis, history (yes vs.nd)-			0.391	0.191; 0.799			
	BD.bistory (yes vs no) -			0.699	0.073 6.704			
	Overtis, history (yes vs.nc)-			1.721	0.715; 4.139			
	Steroid intake (yes vs ne)-			0.468	0.226; 0.968			
	coDMARDs intake (yes vs ne)		+	0.977	0.543; 1.759			
	TRF intake (pes vs mi)-	•		0.235	0.093, 0.595			
	NEAID intake score, paints (0-100)*		*	0.978	0.971, 0.986			
	CRP. mgC		1	0.975	0.951, 0.999			

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### OP0058 PREDICTION OF LOW DISEASE ACTIVITY IN PATIENTS WITH ANKYLOSING SPONDYLITIS TREATED WITH SECUKINUMAB IN REAL WORLD – DATA FROM THE GERMAN AQUILA STUDY

Keywords: Real-world evidence, Spondyloarthritis, Artificial Intelligence

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**Background:** Secukinumab (SEC) proved to be an effective treatment for patients suffering from ankylosing spondylitis (AS) in randomized clinical trials [1]. There is only limited knowledge on prediction of low disease activity (LDA) and treatment strategy in AS patients under SEC treatment in routine clinical care.

**Objectives:** Using real-world data from the German non-interventional study AQUILA [2], the main objectives were (1) to predict LDA in individual AS patients treated with SEC through machine learning methods and (2) to identify the most important predictors and their influence on the prediction using explainable artificial intelligence (XAI).

**Methods:** Data of 580 AS patients from the AQUILA study were used. Thirty-two demographic, clinical and treatment parameters at baseline (BL) served as input data to develop prediction models. LDA was defined as Bath ankylosing spondy-litis disease activity index (BASDAI)  $\leq$  2.0 at week (w) 16 (+/- 6 w). Samples were divided into training (70%) and validation (30%) cohorts. Ten different prediction models were applied and compared. Model performance was measured using area under the receiver operating characteristic curve (AUROC) which represents the probability that a randomly selected patient with LDA will have higher prediction to achieve LDA than a patient with moderate/high disease activity. Additionally, sensitivity and specificity of the prediction model were computed and express the proportion of correctly identified patients who reach or don't

reach LDA at w16, respectively. Shapley XAI estimated importance and impact of each predictor based on how it affected the change in individual prediction [3]. **Results:** The most influencing predictor was BASDAI at BL, followed by the number of pretreatments with biologics, C-reactive protein (CRP), assessment of spondyloarthritis international society health index (ASAS-HI) and patient height (**Figure 1 A**). AUROC of the best performing prediction model was 0.84. Sensitivity and specificity were 0.87 and 0.67, respectively. Applied XAI approach showed that the lower the BL values of BASDAI, ASAS-HI and number of pretreatments with biologics were, the higher the probability of reaching LDA at w16 was. The opposite was the case for BL values of CRP and body height (**Figure 1 A**). The approach also provided visual explanations of patient-individual predictions: Variables with values shown in green color increased probability of reaching LDA at w16, whereas red ones showed the opposite effect (**Figure 1 B**).

**Conclusion:** A promising prediction model accuracy of LDA in AS patients treated with SEC could be reached and validated. Identified main predictors at BL, such as BASDAI and number of pretreatments with biologics, and their direction of influence on the prediction of LDA mostly match the existing clinical knowledge [4]. The analysis showed that XAI can provide useful clinical insights into patient-individual predictions, potentially guiding AS treatment decisions in future.

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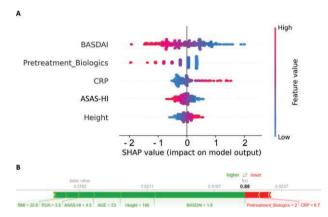


Figure 1. Main results

A: Main predictors at baseline and their direction of influence based on Shapley values [3]

B: Explanation of patient-individual prediction of 88% using baseline data

Assessment of spondyloarthritis international society health index (ASAS-HI), Bath ankylosing spondylitis disease activity index (BASDAI), body mass index (BMI), C-reactive protein (CRP), patient global assessment (PGA), Shapley Additive exPlanations (SHAP)

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# OP0059 EFFECT OF SECUKINUMAB VERSUS ADALIMUMAB BIOSIMILAR ON RADIOGRAPHIC PROGRESSION IN PATIENTS WITH RADIOGRAPHIC AXIAL SPONDYLOARTHRITIS: A RANDOMISED PHASE IIIB STUDY

Keywords: Randomized control trial, Spondyloarthritis, Clinical Trials

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Background: Limited data exist on the effect of biologics in slowing radiographic progression in patients (pts) with radiographic axial spondyloarthritis (r-axSpA). Two-year data from MEASURE 1 showed low radiographic progression with secukinumab (SEC).[1]

Objectives: To compare the effect of SEC vs adalimumab biosimilar (SDZ-ADL) on spinal radiographic progression from SURPASS,[2,3] the first head-to-head study in r-axSpA.

Methods: In this phase IIIb study, bio-naïve pts with active r-axSpA with a BAS-DAI  $\geq$ 4, spinal pain score  $\geq$ 4 (range 0–10), total back pain score  $\geq$ 40 mm (range 0-100 mm), and with hs-CRP ≥5 mg/L or ≥1 syndesmophyte(s) on spinal radiograph were randomised (1:1:1) to SEC (150/300 mg; dose-blinded) or SDZ-ADL (40 mg; open label). Radiographs and MRIs were reviewed by 3 independent central readers (no adjudication performed) blinded to treatment and chronology of images. Primary endpoint was the proportion of pts with no radiographic progression (change from baseline [CFB] in modified Stoke AS Spinal Score [mSASSS] ≤0.5) on SEC vs SDZ-ADL at week (wk) 104 (superiority testing). Secondary endpoints included CFB-mSASSS at wk 104, proportion of pts with ≥1 syndesmophyte(s) at baseline (BSL) with no new syndesmophytes(s) at wk 104, CFB-MRI Berlin sacroiliac joint (SIJ) inflammation score, CFB-AS Spine MRI-activity (ASspiMRI-a) Berlin modification score, and safety.

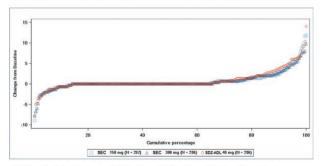
Results: Overall, 859 pts received SEC 150 mg (n=287), 300 mg (n=286), or SDZ-ADL (n=286). With 78.5% male, mean age 42.1 years, mSASSS 16.6, BASDAI 7.1, hsCRP 20.4 mg/L, and 73% with ≥1 syndesmophyte(s), this population had high risk of radiographic progression. At wk 104, cumulative distribution of CFB-mSASSS was similar across arms (Figure 1). Proportion of pts with no radiographic progression was 66.1%, 66.9%, and 65.6% (P=ns, both SEC doses) while mean CFB-mSASSS was 0.54, 0.55, and 0.72 with SEC 150 mg, 300 mg, and SDZ-ADL. Overall, 56.9%, 53.8%, and 53.3% of pts in SEC 150 mg, 300 mg, and SDZ-ADL arms, with a BSL ≥1 syndesmophyte(s) did not develop new syndesmophyte(s) by wk 104 (Table 1). In the MRI sub-set (N=418), mean SIJ scores at BSL and wk 16 were 2.54 and 0.98 (SEC 150 mg), 1.96 and 0.92 (SEC 300 mg), and 1.59 and 0.38 (SDZ-ADL); corresponding spine scores were 3.50 and 1.79, 2.56 and 1.25, and 3.00 and 0.71.

Conclusion: Spinal radiographic progression over 2 years was low with no significant difference between SEC and SDZ-ADL arms. No new safety signals were identified.

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# Figure 1. Probability plot of change from BSL in mSASSS at wk 104



mSASSS, modified Stoke Ankylosing Spondylitis Spinal Score: SDZ-ADL, adalir ar: SEC. seci

#### Table 1. Radiographic assessments at wk 104

No radiographic progression*	: Treatment group	n	No pro- gression rate (%)	Estimated mean (95% CI)	Marginal differ- ence (95% CI) <sup>†</sup>	
	SEC 150 mg	283	66.1	66.63 (60.73, 72.54)	1.51 (–6.63, 9.64)	0.716
	SEC 300 mg	280	66.9	66.80 (60.45, 73.14)	1.67	0.693
	SDZ-ADL 40 mg	283	65.6	65.13 (58.77, 71.49)	-	-
Change from BSL in	Treatment	n	Within treatment		Treatment contrast in LS mean <sup>†</sup>	
mSASSS#	SEC 150 mg	283	<b>LS mean (SE)</b> 0.54 (0.18)		<b>LS mean (SE)</b> -0.18 (0.24)	<b>95% CI</b> -0.65, 0.29
	SEC 300 mg	280	0.55 (0.18)		-0.16 (0.24)	-0.64, 0.32
	SDZ-ADL 40 mg	283	0.72 (0.18)		-	-
No new syndes-	Treatment	n	Pts with r	no new syndes	-Estimated Margi	
mophytes*‡	group	(%)‡	mophyte(	s) (%)	mean (95% CI)	differ- ence (95% CI) <sup>†</sup>
	SEC 150 mg	211 (73.5)	56.9		57.22 (50.16, 64.28)	4.32 (-5.62, 14.27)
	SEC 300 mg	204 (71.3)	53.8		53.98 (46.19, 61.78)	1.09 (-9.13, 11.31)
	SDZ-ADL 40 mg	212 (74.1)	53.3		52.89 (45.54, 60.24)	-

SEC 150 mg, N=287; SEC 300 mg, N=286; SDZ-ADL 40 mg, N=286.

\*Estimated mean, marginal difference, 95% CI, and p-value are from logistic regression model with treatment as a factor and BSL mSASSS score/count of vertebral corners with syndesmophyte as covariate using marginal standardisation method.

LS Mean and 95% CI are from ANCOVA model with treatment as a factor and BSL mSASSS score as covariate.

<sup>†</sup>Comparison vs SDZ-ADL 40 mg

<sup>‡</sup>pts with syndesmophyte(s) at BSL

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OP0060 CLINICAL CONSEQUENCES OF INFLIXIMAB IMMUNOGENICITY AND THE IMPACT OF THERAPEUTIC DRUG MONITORING: SECONDARY ANALYSES OF A RANDOMISED CLINICAL TRIAL

Keywords: Rheumatoid arthritis, bDMARD, Spondyloarthritis

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Background: Neutralising anti-drug antibodies (ADAb) are a problem in treatment with TNF-inhibitors (TNFi). Prospective data are needed to better understand how ADAb formation impacts safety and treatment outcomes of TNFi. Proactive therapeutic drug monitoring (TDM) allows for timely detection of ADAb and this strategy may have a role in reducing the negative clinical consequences of ADAh

Objectives: To explore the temporal relation between anti-infliximab antibody formation and treatment outcomes and adverse events, and to assess the impact of TDM as a strategy to reduce these consequences.

Methods: Patients with immune mediated inflammatory diseases on infliximab therapy (n=615: 181 spondyloarthritis, 120 rheumatoid arthritis, 72 psoriatic arthritis, 114 ulcerative colitis, 83 Crohns disease and 45 psoriasis) were included in the Norwegian Drug Monitoring (NOR-DRUM) trials (1, 2) and randomised to TDM or standard infliximab therapy. Patients were followed for 30 and 52 weeks in the NOR-DRUM A (induction therapy) and NOR-DRUM B (maintenance therapy) trials, respectively, Neutralising ADAb were assessed with a drug sensitive automated fluorescence assay at each infusion. In this sub-study, we assessed the risk of; failure to achieve remission (analysis A), disease worsening during maintenance therapy (analysis B), treatment discontinuation (analysis C) and adverse events (analysis D) in patients developing ADAb compared to patients without ADAb using logistic- or cox regression and Kaplan-Meier survival analyses, stratified by TDM or standard therapy. Regression analyses were adjusted for potential confounders (Table 1). Remission and disease worsening were defined by disease specific composite scores (1, 2).

Results: ADAb were detected in 147/615 (24 %) patients. Patients with ADAb had higher risk of not achieving remission 30 weeks after initiating infliximab therapy (odds ratio (OR) 2.4, 95 % confidence interval (CI) 1.3-4.2, P<0.01) (Table 1, Figure 1A) and of having a disease worsening during 52 weeks of infliximab maintenance therapy (hazard ratio (HR) 2.1, CI 1.4-3.3, P<0.001) (Figure 1B). ADAb formation was not significantly associated with adverse events in general, but the risk of infusion reactions was highly increased in patients with ADAb (HR 29, CI 11-78, P<0.001). The risk of infliximab treatment discontinuation was increased in ADAb positive patients (HR 6.5, CI 4.7-8.9, P<0.001). Patients developing ADAb in the TDM group had lower risk of disease worsening or an infusion reaction than patients with ADAb in the standard infliximab therapy group (Table 1, Figure 1B and C). Patients with ADAb discontinued infliximab treatment more often in the TDM group than in the control group (Table 1, Figure 1D).

Conclusion: Formation of ADAb led to poorer clinical outcomes both during induction and maintenance therapy with infliximab and increased the risk of infusion reactions. Early detection of ADAb by proactive TDM reduced the negative consequences of ADAb, both on infliximab effectiveness and safety, highlighting the role of proactive TDM in optimising TNFi therapy.

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Table 1. Treatment and safety outcomes related to ADAb formation and TDM

Analysis A) Non-remission	OR (CI)	Р
ADAb	2.4 (1.3-4.2)	<0.01
TDM	1.0 (0.7-1.5)	0.9
Analysis B) Disease worsening	HR (CI)	Р
ADAb	2.1 (1.4,3.2)	< 0.01
TDM	0.4 (0.3-0.6)	< 0.001
Analysis C) Infusion reaction	HR (CI)	Р
ADAb	29 (11-78)	< 0.001
TDM	0.3 (0.1-0.7)	< 0.01
Analysis D) Treatment discontinuation	HR (CI)	Р
ADAb	6.5 (4.7-8.9)	< 0.001
TDM	1.4 (1.0-1.8)	0.03

Results from multivariable logistic (A)- or cox (B-D) regression models including the covariates: ADAb, TDM, age, sex, diagnosis, comedication, Results shown in table are risk of A) non-remission week 30, B) disease worsening during 52 weeks of maintenance therapy, C) infusion reactions and D) infliximab treatment discontinuation for patients developing ADAb and for patents in the TDM group.

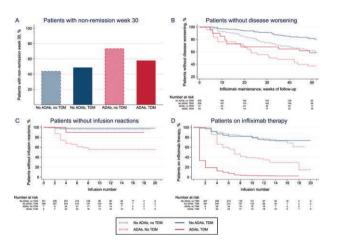


Figure 1.

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OP0061

### DEVELOPMENT OF EXTRA-MUSCULOSKELETAL MANIFESTATIONS IN UPADACITINIB-TREATED PATIENTS WITH PSORIATIC ARTHRITIS, ANKYLOSING SPONDYLITIS, OR NON-RADIOGRAPHIC AXIAL SPONDYLOARTHRITIS

Keywords: Uveitis, Safety, Spondyloarthritis

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