The mean signal intensity of all lesions and MRI planes differed between axSpA (102.385 units?) and non-SpA (48.995) patients for BME ($p<0.001$) but not for FL. Overall, axSpA patients also had significantly more SIJ quadrants with pathologic changes, except for BME and sclerosis in the ventral and fat located in the retroauricular part of the SIJ. The occurrence of erosions in the mid (61 vs. 7) and the ventral (51 vs. 8) part of the SIJ could discriminate best between axSpA and non-SpA (both $p<0.001$).

Conclusion: These data show that although all types of lesions may be found in both patient groups, the anatomic pattern of SIJ involvement can still distinguish axSpA from non-SpA. The localization and morphological appearance of SIJ-MRI features suggestive of axSpA may serve as an additional feature in the definition of a 'positive' MRI both for diagnosis and classification.

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OP0033

WHAT IS AXIAL SPONDYLOARTHRITIS? A LATENT CLASS AND TRANSITION ANALYSIS IN THE SPACE AND DESIR COHORTS

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Background: Axial spondyloarthritis (axSpA) is a disease with a rather heterogeneous presentation that may be difficult to diagnose. Classification criteria, such as the ASAS criteria, which have been developed and validated against the gold-standard 'expert diagnosis', exist, but may suffer from inappropriate circularity because features deemed important by experts (e.g. sacroiliitis on MRI) may have easily got a too prominent, and therefore biased, role. If classification criteria are used inappropriately to confirm a diagnosis, overdiagnosis ('too much SpA') may be an unwarranted consequence.

Objectives: To gain an unbiased insight into the concept of axSpA, by circumventing expert opinion and investigating its 'latent constructs': We examined the SpA-features' mutual statistical coherence, established the unbiased 'Gestalt' of SpA, and evaluated how well the ASAS axSpA classification criteria capture these 'latent constructs'.

Methods: Two independent cohorts of patients (pts) with early onset chronic back pain (SPACE cohort) and inflammatory back pain (IBP) (DESIR cohort) were included. Latent class analysis (LCA) (different than a cluster analysis) was used to estimate the latent (i.e. unobserved) 'Gestalt' of axSpA by modelling the covariance of the observed SpA features (without 'a priori' assumptions on their 'weights'). The selected best LCA model splits axSpA into a number of (clinically

meaningful) classes with best data fit. Each class was labelled by us and named according to most prominent features. The latent axSpA classes were then used as 'gold-standard' against which the ASAS axSpA, pSpA (ignoring IBP) and both (SpA criteria) were tested. Finally, 5-year follow-up data from DESIR were used to perform a latent transition analysis (LTA) in order to examine if patients change classes over 5-year time.

Table 1. Latent class analysis model in SPACE (N=465)

	'Axial' (P*=15.9%)	'IBP+Peripheral' (P*=20.0%)	'At risk' (P*=24.3%)	'No SpA' (P*=39.7%)
	Estimated probability (95% CI)	Estimated probability (95% CI)	Estimated probability (95% CI)	Estimated probability (95% CI)
Inflammation on MRI-SIJ (ASAS)	0.74 (0.52; 0.88)	0.04 (0.01; 0.14)	0.00 (0.00; 1.00)	0.03 (0.01; 0.08)
Radiographic sacroiliitis (mNY)	0.32 (0.19; 0.49)	0.09 (0.04; 0.20)	0.01 (0.00; 0.32)	0.03 (0.01; 0.08)
Elevated CRP (≥ 6 mg/dL)	0.49 (0.32; 0.65)	0.22 (0.13; 0.34)	0.21 (0.13; 0.32)	0.20 (0.15; 0.28)
BME on MRI-Spine (≥ 5 lesions)	0.25 (0.14; 0.42)	0.02 (0.00; 0.18)	0.00 (0.00; 1.00)	0.00 (0.00; 0.11)
≥ 1 syndesmophyte on X-spine	0.03 (0.01; 0.11)	0.06 (0.03; 0.14)	0.00 (0.00; 1.00)	0.04 (0.02; 0.08)
Good response to NSAIDs (ever)	0.59 (0.41; 0.75)	0.85 (0.72; 0.93)	0.25 (0.14; 0.42)	0.20 (0.14; 0.29)
Peripheral arthritis (ever)	0.17 (0.09; 0.30)	0.44 (0.30; 0.58)	0.04 (0.01; 0.15)	0.10 (0.06; 0.17)
Dactylitis (ever)	0.02 (0.00; 0.17)	0.18 (0.11; 0.29)	0.00 (0.00; 1.00)	0.03 (0.01; 0.07)
Heel enthesitis (ever)	0.10 (0.04; 0.25)	0.66 (0.50; 0.79)	0.13 (0.06; 0.24)	0.04 (0.01; 0.11)
HLA-B27	0.84 (0.67; 0.93)	0.33 (0.23; 0.46)	0.69 (0.24; 0.94)	0.00 (0.00; 1.00)
Family history of SpA	0.38 (0.24; 0.54)	0.50 (0.38; 0.62)	0.71 (0.56; 0.82)	0.21 (0.10; 0.38)
Psoriasis (ever)	0.10 (0.04; 0.22)	0.31 (0.21; 0.43)	0.02 (0.00; 0.23)	0.08 (0.05; 0.14)
Uveitis (ever)	0.13 (0.06; 0.24)	0.07 (0.03; 0.17)	0.12 (0.06; 0.22)	0.02 (0.00; 0.11)
IBD (ever)	0.03 (0.01; 0.16)	0.15 (0.08; 0.25)	0.00 (0.00; 1.00)	0.10 (0.06; 0.17)
Inflammatory back pain	0.68 (0.55; 0.79)	1.00 (0.00; 1.00)	0.66 (0.53; 0.76)	0.09 (0.03; 0.59)

* Probability of the latent class. Values are the conditional probability (95% confidence interval) for each SpA feature positivity within each latent class (range: 0-1). Values in **bold** highlight dominant features between latent classes. Values in *italic* highlight dominant features (probability >50%) within each class. BME, bone marrow edema; IBD, inflammatory bowel disease.

Table 2. Latent class analysis model in DESIR (N=576)

	'Axial' (P*=18.8%)	'IBP+Peripheral' (P*=26.7%)	'At risk' (P*=54.5%)
	Estimated probability (95% CI)	Estimated probability (95% CI)	Estimated probability (95% CI)
Inflammation on MRI-SIJ (ASAS)	0.83 (0.69; 0.92)	0.22 (0.15; 0.30)	0.09 (0.06; 0.16)
Radiographic sacroiliitis (mNY)	0.58 (0.45; 0.70)	0.06 (0.02; 0.13)	0.02 (0.01; 0.08)
Elevated CRP (≥ 6 mg/dL)	0.56 (0.44; 0.67)	0.41 (0.32; 0.51)	0.14 (0.10; 0.20)
BME on MRI-Spine (≥ 5 lesions)	0.20 (0.13; 0.30)	0.00 (0.00; 1.00)	0.01 (0.00; 0.03)
≥ 1 syndesmophyte on X-spine	0.11 (0.06; 0.20)	0.05 (0.02; 0.11)	0.06 (0.04; 0.10)
Good response to NSAIDs (ever)	0.97 (0.90; 0.99)	0.84 (0.76; 0.90)	0.82 (0.77; 0.86)
Peripheral arthritis (ever)	0.09 (0.04; 0.20)	0.73 (0.49; 0.88)	0.00 (0.00; 1.00)
Dactylitis (ever)	0.03 (0.01; 0.15)	0.46 (0.36; 0.55)	0.01 (0.00; 0.31)
Heel enthesitis (ever)	0.26 (0.18; 0.37)	0.60 (0.51; 0.69)	0.45 (0.39; 0.51)
HLA-B27	0.90 (0.79; 0.96)	0.52 (0.43; 0.61)	0.53 (0.47; 0.59)
Family history of SpA	0.48 (0.37; 0.58)	0.44 (0.36; 0.53)	0.41 (0.36; 0.48)
Psoriasis (ever)	0.09 (0.04; 0.18)	0.29 (0.22; 0.38)	0.14 (0.10; 0.19)
Uveitis (ever)	0.08 (0.04; 0.18)	0.12 (0.07; 0.20)	0.08 (0.05; 0.12)
IBD (ever)	0.02 (0.00; 0.10)	0.05 (0.02; 0.11)	0.05 (0.03; 0.08)

* Probability of the latent class. Values are the conditional probability (95% confidence interval) for each SpA feature positivity within each latent class (range: 0-1). Values in **bold** highlight dominant features between latent classes. Values in *italic* highlight dominant features (probability >50%) within each class. BME, bone marrow edema; IBD, inflammatory bowel disease.

Results: In total, data of 465 (SPACE) and 576 (DESIR) pts were analyzed. SPACE yielded 4 latent classes (Table 1). The 'Axial' class characterized by highest likelihood on abnormal imaging and HLA-B27-positivity; the 'IBP+Peripheral' class had 100% likelihood of IBP in association with peripheral signs. The 'At risk' class is anchored on a positive family history and HLA-B27 positivity in association with IBP; and the 'No SpA' class had very low likelihoods for all SpA-features which were correlated. The independent analysis in DESIR (without 'no-SpA' patients) yielded identical latent classes ('Axial':19%; 'IBP+Peripheral':27% and 'At risk':55%) (Table 2). The ASAS axSpA criteria, tested in SPACE ('No SpA' absent in DESIR), captured 67% of the patients in the 'Axial' and 'IBP+Peripheral' classes ('latent gold-standard'), but sensitivity was better (87%) if axSpA and pSpA criteria were combined. Of note, the axSpA criteria captured only 4% of the patients from the 'No SpA' class. Importantly, the LTA suggests that transition between classes over time was highly unlikely. 'Axial' and 'IBP+Peripheral' patients did not switch and only 11% of 'At risk' pts had switched to 'IBP+Peripheral' after 5 years.

Conclusion: The 'Gestalt' of axial spondyloarthritis comprises three distinguishable clinical entities ('pure axial SpA', 'axial SpA with peripheral signs', and 'axial SpA at risk'). Patients keep their clinical entity over 5 years and transition is very rare. The 'Axial' and 'IBP+Peripheral' entities are best captured by combining the ASAS axSpA and pSpA criteria.

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