SAT0710

RISK ASSOCIATION FOR ANKYLOSING SPONDYLITIS USING A GENETIC RISK SCORE COMBINING 110 SNPS OF GENOME-WIDE SIGNIFICANCE IN THE POPULATION-BASED HUNT STUDY

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Background: The genetic component of AS development is estimated to ~90%. About 20% of the known heritability for AS is attributed to *HLA-B27* and about 7.4% to 113 SNPs found in genome-wide association studies,¹ with a further ~60% of heritability determined by as yet unmapped variants.

Objectives: To evaluate whether a weighted genetic risk score (wGRS) developed based on the currently identified SNPs is predictive of AS in the Norwegian population-based Nord-Trøndelag Health Study (HUNT).

Methods: HUNT invited the entire adult population of Nord-Trøndelag county. We used data from HUNT2 (1995–97) and HUNT3 (2006–8). AS cases were diagnosed from hospital records using the Modified New York Criteria. Participants with other inflammatory arthritis were excluded, leaving 181 AS cases and 55 586 controls. Genotyping was performed with Illumina HumanCoreExome arrays. Imputation was performed with Minimac3 based on European ancestry data. Imputed or genotyped data were available for 110 (97%) of the 113 SNPs. We used rs4349859 to indicate *HLA-B27* carrier state (positive/negative). The wGRS was calculated by addition of risk alleles and weighting by the published OR from,¹ representing each person's carriage of all risk variants. Data were analysed using logistic regression. Four models were compared using AUC analysis: 1) the wGRS only; 2) *HLA-B27* only; 3) the wGRS and *HLA-B27*; 3) the wGRS, *HLA-B27*, age, gender, BMI, hypertension, and smoking (never/previous/present). HUNT had ethical approval and participants gave informed consent.

Results: At baseline, mean age for cases was 43 years, 61% were men and 87% were *HLA-B27* positive. The corresponding figures for controls were 46 years, 47% men and 12.7% *HLA-B27* positive. The mean wGRS was 14.37 (range: 10.93 to 17.41). The wGRS alone was associated with AS (OR=1.7 for one unit increase, $p<0.001$), but had low discriminative ability (AUC: 0.62, 95% CI: 0.58–0.66). *HLA-B27* alone was also associated with AS (OR=48^{31–74}), $p<0.001$ and showed high discriminative ability (AUC: 0.88 (0.85–0.90)). AUC for the combined wGRS and *HLA-B27* model (0.89 (0.87–0.92)) was higher than for the univariate models ($p<0.001$ vs. wGRS only; $p<0.01$ vs. *HLA-B27* only). Further addition of age, gender, BMI, hypertension, and smoking to the combined model gave a small improvement (AUC: 0.91 (0.88–0.94), $p=0.03$).

Conclusions: The wGRS was associated with AS, but had low predictive ability in a population-based setting. *HLA-B27* was a much better predictor. Addition of clinical variables only slightly improved prediction, in accordance with the high genetic component in AS pathophysiology. Discovery and inclusion of more genetic risk variants, epigenetic factors, other demographic factors, and interaction terms, in addition to more efficient statistical approaches such as genome-wide risk score development, could improve prediction. Study limitations are false positive- or –negative AS diagnoses and potential selection bias of participants in HUNT.

REFERENCE:

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SAT0711

SENSE OF COHERENCE PREDICTS DEVELOPMENT OF CHRONIC WIDESPREAD PAIN OVER TIME

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Background: Chronic musculoskeletal pain is a common condition that has become a great challenge for those affected and for the society. Although much is known about factors that are associated with chronic pain, there is less of knowledge on the influence of salutogenetic factors as measured by sense of coherence (SOC) on pain, especially over time.

Objectives: To investigate the associations between SOC, health status and chronic musculoskeletal pain in a general population followed over 13 years.

Methods: A cross-sectional and longitudinal cohort study, based on a postal survey at baseline 2003 and a follow-up survey in 2016, including a sample of 1850 subjects from the general population. SOC was measured by a short three item

questionnaire, SOC-3. Subjects were divided into three levels of SOC (low, moderate, high). Health status was measured by SF-36. Pain was reported on a pain mannequin with 18 predefined regions, and was categorised into three pain groups; no chronic pain (NCP), chronic regional pain (CRP), and chronic widespread pain (CWP). CWP was defined according to the ACR 1990 criteria for fibromyalgia. The results were controlled for age and gender, and where appropriate also for pain group.

Results: Subjects with high SOC at baseline reported higher mean scores in all eight SF-36 dimensions than those with moderate or low SOC ($p<0.001$ for all dimensions). Those with high SOC also reported a higher prevalence of NCP (66% vs. 34%) and a lower prevalence of CWP (8% vs. 33%) than subjects with low SOC ($p<0.001$). In the long term follow-up a report of high SOC significantly ($p<0.001$) predicted a better outcome with regard to development and persistence of CWP. Subjects with NCP and high SOC at baseline were less likely to report CWP in the thirteen-year follow-up than those with low SOC (3.6% vs. 10%). For those with CWP at baseline, subjects with high SOC more often reported less chronic pain (NCP or CRP) at follow-up compared to those with low SOC (43.5% vs. 20.5%). When controlled for age, gender and pain, there were no significant differences in SF-36 at follow-up for subjects with different level of SOC at baseline.

Conclusions: High level of SOC predicted a lower risk to develop CWP over time, and a better prognosis for those with CWP at baseline. The findings suggest that it would be beneficial to develop methods and make efforts to strengthen SOC, both when meeting patients in the clinic and when making interventions on a national level.

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SAT0712

EVALUATION OF STRUCTURAL DAMAGE IN PSORIATIC ARTHRITIS: A SYSTEMATIC LITERATURE REVIEW

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Background: Measuring structural damage in psoriatic arthritis (PsA) is important since it is the ultimate goal of treatment.¹ Similar to rheumatoid arthritis (RA), structural damage in PsA is evaluated mainly on x-rays, but there is no consensus about the radiologic scoring method to use in trials. Usually scores from RA are used and modified so they can capture PsA specific features, such as distal interphalangeal (DIP) joints involvement, bone proliferation, periostitis, osteolysis etc.²

Objectives: The objective of this study was to analyse existing data on the definition and scoring methods of structural damage in studies on PsA.

Methods: A systematic literature review was performed. Studies evaluating structural damage in PsA were identified in Pubmed/Medline and Embase on 10th December 2017. Several synonyms for the main components (i.e. psoriatic arthritis, structural damage, radiologic progression) were used. No search limits were applied. Studies not assessing structural damage or not providing enough information on the definition of damage were not included, nor reviews, case-reports, letters. Descriptive statistics were used.

Results: In all, 3321 abstracts were identified of which 61 full length articles were included in the final analysis. The majority were observational studies (59%). Only 3 studies were on axial PsA (axPsA) and around 10% of the studies also had a control population, e.g., RA, osteoarthritis, spondyloarthritis and healthy individuals. In total, a median of 220 (minimum-maximum: 12–1077) patients were included. Most of the studies used the CASPAR criteria (63.9%). A wide majority of studies (80.3%) assessed progression of structural damage.

Structural damage was defined mainly radiographically (77%), followed by the clinical definition (24.6%) and to a lesser extent by other investigations: magnetic resonance imaging (8.2%), computer tomography (4.9%) and ultrasound (3.3%), respectively.

Radiologic assessment of peripheral damage included radiographs of hands and feet, but was very heterogeneous, with most of the studies using the scores “borrowed” from RA and modified for PsA. Hence, 97.8% of the studies using the radiographic evaluation of damage have adapted the scoring method so that it includes the DIP joints of hands and feet. The following elements were included in the radiographic scores: space narrowing 42 studies (93.3%), erosions 44 (97.8%), osteolysis 24 (53.3%), proliferation 12 (26.7%), periostitis 9 (20%), tuft resorption 14 (31.1%), pencil in cup 17 (37.8%), juxta-articular osteopenia/osteoporosis 4 (8.9%), subluxation 6 (13.3%), and ankylosis 5 (11.1%) (table 1). In axPsA radiographic damage was defined by sacroiliitis grades and spine damage, i.e., presence of syndesmophytes and scores such as BASRI-spine, mSASSS, RASSS and PASRI.

Abstract SAT0712 – Table 1. Frequency of specific psoriatic arthritis radiographic features

	Randomized control trials	Observational studies	Total number of studies (out of N=61)
Erosions	24 (54.5%)	20 (45.5%)	44
Space narrowing	24 (57.1%)	18 (42.9%)	42
Osteolysis	14 (58.3%)	10 (41.7%)	24
Pencil in cup	10 (58.8%)	7 (41.2%)	17
Tuft resorption	6 (42.9%)	8 (57.1%)	14
Proliferation	6 (50%)	6 (50%)	12
Periostitis	5 (55.6%)	4 (44.4%)	9
Subluxation	3 (50%)	3 (50%)	6
Ankylosis	2 (40%)	3 (60%)	5
Juxta-articular osteopenia/osteoporosis	0 (0%)	4 (100%)	4

Conclusions: Damage in PsA is usually evaluated radiologically. Although radiographic scores are almost always adapted for PsA in order to include DIP joints, the other PsA specific radiographic elements are not so frequently assessed. A more specific but also a feasible radiographic score for PsA damage to be universally used in studies is still needed. Further research on other methods of evaluating PsA damage is also needed since data is scarce.

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SAT0713 INCIDENCE OF EROSIVE INTERPHALANGEAL OA IS STRONGLY ASSOCIATED WITH AGE, FEMALE GENDER, WHITE RACE, AND PRE-EXISTING HAND OA: DATA FROM THE OSTEOARTHRITIS INITIATIVE

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Background: Symptomatic erosive interphalangeal OA (SEIPOA) is differentiated from hand OA by the presence of central joint erosions and is more strongly associated with hand pain, disability and finger deformity. There are no specific treatments for SEIPOA and relatively little is known about its incidence and natural history.

Methods: We evaluated participants in the Osteoarthritis Initiative (OAI), a multicenter cohort study of 4796 adults with or at risk for symptomatic knee OA recruited at 4 clinical sites between February 2004 and May 2006, which included postero-anterior radiographs of one or both hands at baseline and at 48 months, as well as questions about joint pain including the hand (based on a homunculus where patients indicated left or right hand pain) and self-reported physician-diagnosed hand OA.

Trained readers scored the severity of OA in 16 joints of the dominant hand using the Kellgren Lawrence scale and classified presence of central erosions according to the OARS Atlas of radiographic features: 2nd-5th distal interphalangeal (DIP) joints, 2nd-5th proximal interphalangeal (PIP) joints, 1st-5th metacarpophalangeal (MCP) joints, thumb interphalangeal (IP) joint, thumb-base joints (i.e., first carpometacarpal (CMC-1) joint and the scaphotrapezial (ST) joint).

We classified erosive interphalangeal OA (EIPOA) based on presence of OA (KL ≥2) in at least one IP joint on two different fingers (excluding thumb base joints) with at least one with a central erosion and symptomatic erosive interphalangeal OA (SEIPOA) if there was also a report of hand pain.

Baseline characteristics were examined by incident SEIPOA and EIPOA using ANOVA for continuous variables and chi-square analysis for categorical variables. Odds ratios were calculated to estimate the strength of association with

incident SEIPOA. A p-value≤0.05 was considered significant. All analyses were conducted with SAS 9.4.

Results: 3604 participants had hand radiographs at baseline and 48 months; 18 radiographs were not readable and 121 had prevalent SEIPOA at baseline, leaving 3465 individuals eligible for analysis. The average age was 60.8 years (sd=9.1), 56.1% were female, and 81.3% were white.

133 individuals (3.8%) developed incident SEIPOA over the 4 year observation period. They had greater burden of IP OA at baseline (1.9 vs. 6.2 joints, p<0.001) and were more likely to report a diagnosis of hand OA (13.0% vs. 42.9%, p<0.001) than those who did not develop SEIPOA. 97.7% of the incident SEIPOA occurred in hands with radiographic hand OA, vs. 2.3% in hands without radiographic OA. SEIPOA incidence was strongly associated with older age, female gender, white race, smoking, lower BMI and lower level of physical activity (Image 1). Results were similar for radiographic EIPOA with the exception of the association with hypertension.

	No SEIPOA (n=3332)	SEIPOA (n=133)	p-value	OR (95% CI)
Age, years (mean, sd)	60.6 (9.1)	66.6 (7.6)	<0.001	2.00 (1.66, 2.41)
Gender (n, %)			<0.001	
Female	1844 (55.3)	99 (74.4)		2.35 (1.58, 3.49)
Race/Ethnicity (n, %)			0.003	
White	2695 (80.9)	121 (91.0)		2.38 (1.31, 4.34)
Smoking Status (n, %)			0.007	
Ever smoked	1313 (39.4)	69 (51.1)		1.61 (1.14, 2.28)
BMI, kg/m ² (mean, sd)	28.6 (4.8)	27.0 (4.2)	<0.001	0.69 (0.57, 0.84)
Waist Circumference > cut-point (n, %)	2404 (74.1)	110 (82.7)	0.025	1.68 (1.06, 2.64)
Diabetes (n, %)	219 (6.7)	11 (8.5)	0.436	1.29 (0.68, 2.42)
Hypertension (n, %)	1652 (49.6)	84 (63.2)	0.002	1.74 (1.22, 2.50)
PASE score (mean, sd)	166 (82.3)	137 (72.5)	<0.001	0.68 (0.56, 0.82)
# joints with OA sans TB (mean, sd)	1.9 (2.6)	6.2 (2.6)	<0.001	3.11 (2.67, 3.62)
MD diagnosed hand OA (n, %)	434 (13.0)	57 (42.9)	<0.001	5.01 (3.50, 7.16)

Note: OR's are calculated per SD for continuous variables

Figure 1. Comparison of baseline characteristics by incident SEIPOA group

Conclusions: Incidence of SEIPOA in older people is substantial and approximates that of rheumatoid arthritis. SEIPOA is strongly related to age, female gender, and white race, develops in the setting of pre-existing hand OA, and is somewhat associated with reduced BMI and lower level of physical activity.

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SAT0714 IMPACT OF PM10 ON THE BURDEN OF RAYNAUD'S PHENOMENON SECONDARY TO SYSTEMIC SCLEROSIS

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Background: Raynaud's phenomenon (RP) is the most frequent manifestation of patients with systemic sclerosis (SSc) and it is responsible for significant morbidity. RP has been ranked by patients with SSc as the second most disturbing related-disease symptom.¹ It's well known that RP, defined as episodic digital ischemia characterised by pain, numbness and digital colour changes, is provoked by environmental factors such as cold temperature and smoking exposure.² No data are available on the impact of particulate matter (PM) exposure on SSc-RP severity.

Objectives: Our aim was to evaluate the association between PM with aerodynamic diameter ≤10 µm (PM₁₀) and SSc-RP severity.

Methods: We applied multivariable continuous ordinal regression model to evaluate the association between short-term exposure to PM₁₀ and a measure of RP severity (in terms of number and duration of RP attacks, numbness, pain, burning and tingling) as measured by a Visual Analogue Scale (VAS). The model was then adjusted by sex, intravenous prostacyclin therapy (alprostar or iloprost), SSc subtype, general health (GH) VAS and season. Daily PM₁₀ concentrations, from monitoring stations measured by Regional Environmental Protection Agency (ARPA Lombardia), were used to assign short-term exposure (mean of the 3 days preceding the evaluation) to each study subjects at his/her area of residence.

Results: We enrolled 87 consecutive patients with SSc-RP from September 2016 to February 2017. 88.5% were female, mean age was 61 years, median time from diagnosis was 14 years (q1-q3: 7–21 years), and 10% had diffuse cutaneous SSc. The median VAS severity was 5 mm (q1-q3: 2–7 mm). 43.7% were treated with prostacyclin therapy.