Figure 2: Ratios of levels in arbitrary units (aU/mL) for three AMPAs per gram per liter (g/L) Total IgG in the serum of four RA populations. Ratios are only shown in patients that were positive for the AMPA. Lines indicate median and interquartile range; p-values correspond to Mann-Whitney U tests. The range of aU/mL per g/L are not directly comparable between AMPAs.

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SAT0586

PREVALENCE AND RISK FACTORS FOR CARDIO-METABOLIC ABNORMALITIES IN PATIENTS WITH INFLAMMATORY ARTHRITIS ATTENDING CARDIO-RHEUMATOLOGY PRIMARY PREVENTION CLINICS

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Background: Cardio-metabolic abnormalities are common in patients with inflammatory arthritis (IA) but tend to be under-recognized and under-treated.

Objectives: We aimed to compare the prevalence and risk factors for cardio-metabolic abnormalities between patients with rheumatoid arthritis (RA), psoriatic arthritis (PsA) and ankylosing spondylitis (AS).

Methods: Consecutive patients enrolled in the University of Toronto Cardio-Rheumatology Network from July 2017 to August 2019 were analyzed. This is a primary prevention program that uses structured clinical, laboratory and multimodal imaging to diagnose and treat cardiovascular disease (CVD). Patients with a rheumatologist-confirmed diagnosis of RA, PsA or AS with no known CVD were evaluated. Information about IA diagnosis, medications and comorbidities was recorded. Each patient was evaluated by a cardiologist focusing on CVD risk assessment. We evaluated the prevalence of previously recorded and newly recognized cardio-metabolic risk factors including hypertension, dyslipidemia, obesity and diabetes. The prevalence of these abnormalities was compared between IA diagnoses. Regression models were used to assess the association between diagnosis and cardio-metabolic abnormalities after adjusting for demographics, smoking, BMI, measures of disease activity and medications.

Results: A total of 358 patients (201 RA, 124 PsA, 33 AS) were assessed (mean age 59±10.5 years, 68.7% female). Hypertension was reported in 33%, dyslipidemia in 26.8%, diabetes mellitus in 8.9% and overweight/obesity in 69.7% (Figure 1). Newly detected elevations in lipids were frequent for triglycerides (9.3%), non-HDL-cholesterol (6%), and LDL-cholesterol (2.7%). Elevated HbA1c occurred in 1.4% and newly diagnosed hypertension occurred in 9.8%. A total of 32.8% patients required a change or initiation of medications for their cardio-metabolic abnormalities (21.7% lipid-lowering therapy, 14.6% aspirin, 11.1% anti-hypertension therapy). Patients with PsA had the highest prevalence of cardio-metabolic abnormalities including dyslipidemia, obesity and hypertension. Having hypertension (prior or new diagnosis), elevated levels of triglycerides, non-HDL cholesterol, total cholesterol and BMI were associated with PsA vs. RA after adjusting for potential confounders (all p<0.05) (Figure 2). No significant association was found between cardio-metabolic abnormalities and AS vs. PsA or RA.

Conclusion: Dedicated cardio-rheumatology clinics have improved CVD screening and management in an IA population. The burden of cardio-metabolic abnormalities is elevated in PsA and suggests that tailored strategies to reduce adverse CVD events are particularly needed in this subgroup.

Figure 1 – The Prevalence of Cardiovascular Risk Factors (Previously diagnosed and Newly diagnosed)

Figure 2 – The Association between Disease Category and Cardiovascular Risk Factors by Adjusted regression coefficients*

*Regression coefficients are adjusted for: age, sex, BMI, smoking, NSAIDs, corticosteroids, DMARDs, Biologics, tender and swollen joint counts, pain level and hsCRP

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SAT0587

MACHINE-LEARNING DERIVED ALGORITHMS FOR OUTCOMES PREDICTION IN RHEUMATIC DISEASES: APPLICATION TO RADIOGRAPHIC PROGRESSION IN EARLY AXIAL SPONDYLOARTHRITIS

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Background: Axial spondyloarthritis (axSpA) is a chronic rheumatic disease that encompasses various clinical presentations: inflammatory chronic back pain, peripheral manifestations and extra-articular manifestations. The current nomenclature divides axSpA in radiographic (in the presence of radiographic sacroiliitis) and non-radiographic (in the absence of radiographic sacroiliitis, with or without MRI sacroiliitis). Given that the functional burden of the disease appears to be greater in patients with radiographic forms, it seems crucial to be able to predict which patients will be more likely to develop structural damage over time. Predictive factors for radiographic progression in axSpA have been identified through use of traditional statistical models like logistic regression. However, these models present some limitations. In order to overcome these limitations and to improve the predictive performance, machine learning (ML) methods have been developed.

Objectives: To compare ML models to traditional models to predict radiographic progression in patients with early axSpA.

Methods: Study design: prospective French multicentric cohort study (DESIR cohort) with 5 years of follow-up. Patients: all patients included in the cohort, i.e. 708 patients with inflammatory back pain for >3 months but <3 years, highly suggestive of axSpA. Data on the first 5 years of follow-up was used. Statistical analyses: radiographic progression was defined as progression either at the spine (increase of at least 1 point per 2 years of mSASSS scores) or at the sacroiliac joint (worsening of at least one grade of the mNY score between 2 visits). Traditional modelling: we first performed a bivariate analysis between our outcome (radiographic progression) and explanatory variables at baseline to select the variables to be included in our models and then built a logistic regression model (M1). Variable selection for traditional models was performed with 2 different methods: stepwise selection based on

Akaike Information Criterion (stepAIC) method (M2), and the Least Absolute Shrinkage and Selection Operator (LASSO) method (M3). We also performed sensitivity analysis on all patients with manual backward method (M4) after multiple imputation of missing data. Machine learning modelling: using the "SuperLearner" package on R, we modelled radiographic progression with stepAIC, LASSO, random forest, Discrete Bayesian Additive Regression Trees Samplers (DBARTS), Generalized Additive Models (GAM), multivariate adaptive polynomial spline regression (polymars), Recursive Partitioning And Regression Trees (RPART) and Super Learner. Finally, the accuracy of traditional and ML models was compared based on their 10-foldcross-validated AUC (cv-AUC).

Results: 10-fold cv-AUC for traditional models were 0.79 and 0.78 for M2 and M3, respectively. The 3 best models in the ML algorithm were the GAM, the DBARTS and the Super Learner models, with 10-fold cv-AUC of: 0.77, 0.76 and 0.74, respectively (Table 1).

Table 1. Comparison of 10-fold cross-validated AUC between best traditional and machine learning models.

Best models	Cross-validated AUC
Traditional models	
M2 (step AIC method)	0.79
M3 (LASSO method)	0.78
Machine learning approach	
SL Discrete Bayesian Additive Regression Trees Samplers (DBARTS)	0.76
SL Generalized Additive Models (GAM)	0.77
Super Learner	0.74

AUC: Area Under the Curve; AIC: Akaike Information Criterion; LASSO: Least Absolute Shrinkage and Selection Operator; SL: SuperLearner. N = 295.

Conclusion: Traditional models predicted better radiographic progression than ML models in this early axSpA population. Further ML algorithms image-based or with other artificial intelligence methods (e.g. deep learning) might perform better than traditional models in this setting.

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SAT0588

PREVALENCE, INCIDENCE, AND THE CARDIOVASCULAR AND CEREBROVASCULAR RISKS OF NONTRAUMATIC AVASCULAR NECROSIS IN SOUTH KOREA

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Background: Due to the shared mechanism of nontraumatic avascular necrosis (AVN) and endothelial dysfunction, the associations of AVN with increased cardiovascular and cerebrovascular events have been suggested in the several population-based studies.

Objectives: This study aimed to estimate the prevalence and incidence of non-traumatic AVN in South Korea from the Korean National Health Insurance Service Sample Cohort Database 2.0 (2006-2015) and to evaluate the risk of major cardiovascular and cerebrovascular events among patients with nontraumatic AVN.

Methods: We defined an incident case as a newly diagnosed and registered patient in the registry in that year, with a 2-year washout period. Prevalent cases were defined as all patients with nontraumatic AVN in the corresponding year. To evaluate the cardiovascular and cerebrovascular risks in patients with AVN, we set AVN group composed of patients with an initial diagnosis of non-traumatic AVN between 2008 and 2010 (n=1,150). The comparison group was composed of randomly selected subject (5 per patient with AVN; n = 5,750) who were matched to the AVN group according to age, sex, resident area, and year of AVN diagnosis. The development of major cardiovascular and cerebrovascular events was tracked in each sampled patient until 2015. Cox proportional hazard regressions were used to calculate the overall risks for the development of major cardiovascular and cerebrovascular events.

Results: From 2008 to 2015, the prevalence of nontraumatic AVN increased gradually, but its incidence did not change, with an annual average incidence of 413 per 1 million population and the male-to-female ratio of 1.2:1. The peak incidence occurred in the 50-59 year age group. The incident AVN was more prevalent in male than in female under 70, but there was female predominance after the age of 70 (Figure 1). The patients with AVN had a higher cumulative incidence of major adverse cardiovascular and cerebrovascular events than controls (19.5% versus 14.9%; p = 0.017). Upon univariate Kaplan-Meier method with the log-rank test, there was a significant difference in major cardiovascular and cerebrovascular events-free survival rates between AVN group and control group (p <0.001). However, after adjusting for potential confounders including hypertension, diabetes, dyslipidemia, and use of steroid or statin, the association between AVN group and major adverse cardiovascular and cerebrovascular events was insignificant (adjusted HR 1.114, 95% CI 0.959-1.295, p=0.158).

Conclusion: In this population-based cohort study, we provided the updated epidemiologic data of Korean patients with nontraumatic AVN. The increased risk for major cardiovascular and cerebrovascular events among AVN patients was not observed in the representative Korean population.

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Figure 1. Age- and sex-distributed incidence of patients with nontraumatic avascular necrosis in Korea, 2008-2015

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SAT0589

RISK FOR PSYCHIATRIC HOSPITALIZATION FOLLOWING A RHEUMA-RELATED HOSPITALIZATION: RESULTS FROM A CZECH NATIONWIDE, COHORT STUDY

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Background: Cohort studies using nationwide health registers have shown an increased risk for affective and anxiety disorders in people with ankylosing spondylitis (AS) and rheumatoid arthritis (RA) (1-3). Moreover, a nationwide cohort study demonstrated an increased risk for mental disorders in people with rheumatic diseases (4).

Objectives: We aimed to investigate the risk for psychiatric hospitalization following a hospitalization for rheumatic disease.

Methods: Using data from the Czech nationwide register of all-cause hospitalizations, we obtained 4 971 individuals hospitalized (index hospitalization) between 2004 and 2012 for rheumatic diseases - RA, spondyloarthritis (including AS, psoriatic arthritis and undifferentiated spondyloarthritis), systemic lupus erythematosus and systemic scleroderma, with no history of psychiatric and rheuma-related hospitalization in the previous 10 years from the index hospitalization. On these individuals, we randomly matched (on age, gender and year of index hospitalization) controls that were hospitalized in the same time period for a non-rheumatic disease and have no history of psychiatric and rheumatic hospitalization in the last 10 years from their index hospitalization, in the ratio of 1:5. We employed conditional logistic regression for assessing the risk for psychiatric hospitalization in the subsequent 3 years from the index hospitalization. To strengthen our results, we repeated the matching step 100 times and run the analysis on each resulting dataset