among participants using observed variables, was used to differentiate “pain phenotypes” considering sex, body mass index (BMI), emotional problems, comorbidities, number of painful sites and knee structural damage on MRI.

Results: Three pain phenotypes were identified: Class 1: high levels of emotional problems and low levels of structural damage (24%); Class 2: high levels of structural damage and low levels of emotional problems (20%); Class 3: relatively low levels of emotional problems and low levels of structural damage (56%). People within Class 1 were more likely to be female, had greater BMI, lower education level, more comorbidities, more severe knee pain and more painful sites as compared to Class 2 and Class 3. Furthermore, WOMAC pain scores and number of painful sites were consistently greater at baseline, 2.6, 5.1 and 10.7 years in Class 1 than Class 2 and Class 3 (all $P < 0.05$).

Conclusions: Psychological and structural factors interact with each other to influence pain perception.

Disclosure of Interest: None declared

DOI: 10.1136/annrheumdis-2017-eular.3033

THU0700 IMMUNOGENICITY IN PATIENTS SWITCHING FROM STABLE ORIGINATOR INFlixIMAB TREATMENT TO CT-P13: ANALYSES ACROSS SIX DISEASES FROM THE 52-WEEK RANDOMIZED NOR-SWITCH STUDY

G.L. Goll¹, I.C. Olsen¹, K.E.A. Lundin², K.K. Jørgensen³, M. Lorentzen⁴, R.A. Klaasen⁵, D.J. Warren⁵, C. Mørk⁶, J. Jahnsen³, E.A. Haavardsholm¹, T.K. Kvien¹, N. Bolstad⁵ on behalf of The NOR-SWITCH study group. ¹Dept of Rheumatology, Diakonhjemmet Hospital; ²Gastroenterology, Oslo University Hospital, Oslo; ³Gastroenterology, Akershus University Hospital, Lørenskog; ⁴Dermatology; ⁵Biochemistry DNR, Oslo University Hospital, Oslo; ⁶Dermatology, St Olav University Hospital, Trondheim, Norway

Background: TNF-inhibitors (TNFi) have improved treatment of Crohn's disease (CD), ulcerative colitis (UC), spondyloarthritis (SpA), rheumatoid arthritis (RA), psoriatic arthritis (PsA) and chronic plaque psoriasis (Ps). The NOR-SWITCH study was funded by the Norwegian government to investigate if switching from originator infliximab (Remicade®, INX) to biosimilar CT-P13 (Remsima®), is safe. Previously, the primary analyses of the pooled indications have been published¹. Immunogenicity is associated with treatment failure and has been of particular concern in switching².

Objectives: The NOR-SWITCH study aimed to assess if immunogenicity to infliximab differed between patients treated with continuous INX vs patients switched to CT-P13.

Methods: The study was designed as a 52-week randomized, double-blind, non-inferiority, phase IV trial. Adult patients with a diagnosis of CD, UC, SpA, RA, PsA or Ps on stable treatment with the originator infliximab were eligible. Patients were randomized 1:1 to either continued INX or switch to CT-P13 treatment, using unchanged dosing regimen. Trough drug levels and neutralizing anti-drug antibodies (ADAb) measurements were done prior to every infusion, but results were not reported during the study. Assays for drug serum levels and ADAb are fully automated on the AutoDELFIA® (PerkinElmer, Waltham, MA) immunoassay platform.

Results: Twenty patients entered the study with detectable ADAb (9 in INX arm, 11 in CT-P13 arm). 36 additional patients developed detectable incident ADAb during the 52-week study period (17 in INX arm, 19 in CT-P13 arm). Incident ADAb in each disease are shown in the table. Patients with detectable ADAb at any time during the study period were more likely to discontinue study drug treatment (7/26 (26.9%) in INX arm, 5/30 (16.7%) in CT-P13 arm) than patients without detectable ADAb (17/214 (7.9%) in INX arm, 13/210 (6.2%) in CT-P13 arm) ($p=0.001$).

Incident ADAb during study period (total number of patients), Full Analysis Set

	INX	CT-P13
All patients in study	17 (241) 7.1%	19 (240) 7.9%
RA patients	6 (39) 15.4%	2 (38) 5.3%
SPA patients	2 (45) 4.4%	5 (46) 10.9%
PSA patients	1 (14) 7.1%	0 (16)
UC patients	5 (47) 10.6%	8 (46) 17.4%
CD patients	3 (75) 3.9%	4 (77) 5.2%
Ps patients	0 (18)	0 (17)

Conclusions: The NOR-SWITCH study demonstrated similar immunogenicity in patients switched to CT-P13 vs those who continued INX treatment, supporting that switch does not influence ADAb formation. Presence of ADAb was associated with termination of study treatment.

References:

[1] Jørgensen KK, Olsen IC, Goll GL et al. Switching from originator infliximab to

biosimilar CT-P13 compared to maintained treatment with originator infliximab (NOR-SWITCH): a 52-week randomised double-blind non-inferiority trial. The Lancet, in press.

[2] Dörner T, Kay J. Biosimilars in rheumatology: current perspectives and lessons learnt. Nat Rev Rheumatol 2015 Dec;11(12):713–24.

Disclosure of Interest: G. Goll Consultant for: Novartis, Pfizer, Orion Pharma, AbbVie, I. Olsen: None declared, K. Lundin Consultant for: Orion Pharma, MSD, Takeda, K. Jørgensen Consultant for: Orion Pharma, AbbVie, Tillott, Intercept, M. Lorentzen: None declared, R. Klaasen: None declared, D. Warren: None declared, C. Mørk Consultant for: Novartis, LeoPharma, ACOHud, AbbVie, Galderma Nordic, Cellgene, J. Jahnsen Consultant for: Orion Pharma, Celltrion, Pfizer, MSD, AbbVie, Takeda, Napp Pharm, AstroPharma, E. Haavardsholm Consultant for: AbbVie, UCB, Pfizer, MSD, Roche, T. Kvien Consultant for: Biogen, BMS, Boehringer Ingelheim, Celltrion, Eli Lilly, Epirus, Hospira, Merck-Serono, Novartis, Orion Pharma, Pfizer, Sandoz, UCB, N. Bolstad: None declared

DOI: 10.1136/annrheumdis-2017-eular.4112

THU0701 THE EFFECTS OF STRUCTURAL DAMAGE ON FUNCTIONAL DISABILITY IN PSORIATIC ARTHRITIS

A. Kerschbaumer, F. Alasti, J.S. Smolen, D. Aletaha. Department of Medicine III (Chairman: Prof. Josef Smolen, MD), Medical University of Vienna, Vienna, Austria

Background: Functional outcomes are central in patients with chronic inflammatory musculoskeletal diseases. It has been shown in rheumatoid arthritis that functional outcomes are impaired in the presence of structural damage, a finding that has not yet been investigated in psoriatic arthritis (PsA), which has a more complex phenotype than rheumatoid arthritis (RA).

Objectives: To quantify the association of radiographic damage with physical function in PsA patients.

Methods: We analysed patients enrolled in the GO-REVEAL study¹ who had received golimumab. We obtained modified Sharp-van-der-Heijde scores (mSvDHS) from X-rays, performed at week 0, 24, 52 and week 104 (n=262). In longitudinal data analysis, we then used generalized estimating equations (GEE) on all patients in DAPSA remission (n=96), utilising all their remission visits, whereby the health assessment questionnaire (HAQ) disability index of each patients visit was used as dependent variable and mSvDHS, joint space narrowing (JSN) and erosion (ERO) scores, respectively, were used as independent variables in separate models.

To analyse effects of structural damage on changeability of functional limitations, we identified a subgroup of patients who had functional limitations at baseline (HAQ₀ ≥ 1) and who showed a major response of DAPSA (improvement of ≥ 85% from baseline). In this model we assess the effect of mSvDHS on changes in HAQ, while adjusting for HAQ at baseline (n=54).

As validation cohort, we analysed a routine clinic PsA cohort with complete cDAPSA (the clinical version of the DAPSA without CRP) and mSvDHS (n=99). A cDAPSA cutoff of ≤ 4 was used to define the remission cohort in an analogous way as described above (n=32).

Results: As shown in table 1 and visualised in figure 1A, for patients in DAPSA remission, significant effects were seen for mSvDHS, JSN and ERO. These results could be confirmed in the validation cohort with patients achieving cDAPSA remission and showed a significant association of HAQ and mSvDHS (Estimate=0.0044, p=0.0176) as well as JSN (Estimate=0.0078, p=0.0165). In the second analysis, looking at patients achieving DAPSA major response, again, results were significant for the association total mSvDHS and JSN. Additionally, higher estimates of JSN, compared to mSvDHS could be observed, with relative HAQ change as outcome parameter (see table 1 and figure 1B).

Table 1. Association of radiographic damage and HAQ in separate GEE models

Dependent variable	DAPSA remission (n=96)		DAPSA Major Response (n=54)	
	HAQ		relative HAQ change*	
Independent variable	Estimate	p	Estimate	p
mSVDHS	0.0037 (0.0018 to 0.0055)	<0.001	-0.0014 (-0.0027 to -0.0002)	0.024
Erosion	0.0054 (0.0021 to 0.0088)	0.001	-0.0021 (-0.0043 to 0.0002)	0.075
JSN	0.0095 (0.0057 to 0.013)	<0.001	-0.0039 (-0.0067 to -0.0012)	0.005

*Adjusted for HAQ at baseline.

Conclusions: Our results suggest that in JSN is functionally more important than

erosions. Functional outcomes have an irreversible component that is strongly related to the amount of structural damage. This needs to be considered when targeting functional outcomes in clinical practice.

References:

- [1] Kavanaugh A, van der Heijde D, McInnes IB, et al. Golimumab in psoriatic arthritis: one-year clinical efficacy, radiographic, and safety results from a phase III, randomized, placebo-controlled trial. *Arthritis Rheum* 2012; 64: 2504–2517.

Acknowledgements:

We thank Janssen for provision of an 80% random data cut of patients in the GO-REVEAL trial for our analyses.

Disclosure of Interest: None declared

DOI: 10.1136/annrheumdis-2017-eular.2835

THU0702 ARE MRI-DETECTED EROSIONS SPECIFIC FOR RA? A LARGE EXPLORATIVE CROSS-SECTIONAL STUDY

D. Boeters¹, W. Nieuwenhuis¹, H. van Steenbergen¹, R. Landewé², M. Reijnders³, A. van der Helm-van Mil¹. ¹Department of Rheumatology, LUMC, Leiden; ²Department of Clinical Rheumatology and Immunology, AMC and Atrium MC, Amsterdam and Heerlen; ³Department of Radiology, LUMC, Leiden, Netherlands

Background: Magnetic resonance imaging (MRI) is recommended in the diagnostic process of rheumatoid arthritis (RA), as it can detect damage at an earlier time point than conventional radiographs. However, MRI-detected erosions as defined by EULAR and included in RAMRIS are also observed in symptom-free controls, especially at older age. It is unclear how RA-specific erosions on MRI can be distinguished from physiological erosions in symptom-free individuals. Therefore this study compared MRI-detected erosions between RA-patients and healthy controls, including evaluation of the effect of age.

Objectives: To compare characteristics of MRI-detected erosions (total erosion score, location and severity of erosions and simultaneous presence of MRI-detected inflammation) in metacarpophalangeal (MCP) and metatarsophalangeal (MTP) joints between RA-patients and healthy controls.

Methods: 422 subjects (229 newly presenting patients with a clinical diagnosis of RA and fulfilling the 2010-criteria and 193 symptom-free controls) underwent contrast enhanced 1.5T MRI of unilateral MCP and MTP joints. The readers were blind to the clinical information. Total erosion score according to the RAMRIS method (hence a combination of number and severity), location and severity of erosions and simultaneous presence of MRI-detected inflammation (synovitis and/or bone marrow edema) were compared between groups, also in relation to age.

Results: First total erosion scores were analyzed. Both in RA-patients and in controls this score was associated with age ($p < 0.001$ in both groups). In addition, at all ages and on group level, RA-patients had 1.2 (95% CI 1.1–1.3) times higher erosion scores than controls. Despite this difference, total erosion scores could not differentiate RA-patients from controls on the individual level, as there was large overlap (Figure). Next different characteristics of erosions were explored within age groups (<40, 40–59, ≥60) to search for RA-specific features. With respect to location, erosions found in MTP5 were specific for RA (spec 90–98% for different age groups). Erosions found in MTP1 were specific for RA if subjects were aged <40 (spec 98%), but specificity decreased by increasing age (spec 86% if aged 40–59 and 63% if aged ≥60). Evaluating the severity revealed that “severe erosions” (scores ≥2) were infrequent in all subjects, but almost exclusively present in RA (spec 98–100%). Finally the simultaneous presence of erosions with inflammation was studied. In the age group <40 years, the simultaneous presence was exclusively observed in RA-patients (specificity 100%); but specificity decreased by age since the combined presence was also seen in symptom-free controls (spec 91% if aged 40–59 and 71% if aged ≥60 years).

Conclusions: Whilst the group of RA-patients at disease presentation had significantly higher erosion-scores than healthy controls, scores of individual subjects were largely overlapping. Some erosion characteristics were specific for RA, but these were present in only a minority of all RA-patients (22%).

Disclosure of Interest: None declared

DOI: 10.1136/annrheumdis-2017-eular.4026

THU0703 SYSTEMATIC REVIEW OF RHEUMATOID ARTHRITIS CLINICAL STUDIES: SUBOPTIMAL STATISTICAL ANALYSIS OF RADIOLOGICAL DATA

S. Mahmood^{1,1}, L. van Tuyl¹, L. Schoonmade², R. Landewé¹, D. van der Heijde³, J. Twisk², M. Boers¹. ¹Amsterdam Rheumatology and immunology Center; ²VUmc, Amsterdam; ³LUMC, Leiden, Netherlands

Background: Radiography is an inexpensive, reliable and reproducible method to detect and quantify progression of damage, an important outcome in rheumatoid arthritis (RA) trials and observational studies. However, the distribution of progression scores is skewed with many low or zero scores. Analysis of such data is challenging, and the choice of analysis technique may influence the result. Current analysis practice is unknown.

Objectives: We systematically searched the literature to identify current practice for the analysis of radiographic progression in clinical trials and observational studies of RA.

Methods: PubMed Embase and Cochrane databases were searched (2006–2016) to identify studies that described analysis techniques to compare radiographic progression in at least two groups. Studies in animals, children as well as conference abstracts and studies not written in English were excluded. Titles and abstracts were screened by one researcher (SM); a second investigator (LvT) evaluated the included cases, doubtful cases and a random sample of the excluded cases.

Information on study design, sample size, assessment methods and analysis technique was extracted by one researcher (SM), in consultation with 3 others (LvT; MB and JT).

Results: Of 5980 identified papers, 252 were eligible. 226 of these reports were on a single study while 26 were on multiple studies in one paper.

Of the 226 studies, 75 studies used parametric techniques, such as t-tests, ANOVA or linear regression to analyze the data. Of these only 12% took the skewed distribution into account. In 78 studies, the continuous data was categorized into two or more groups and analyzed with binomial or ordinal methods, such as chi-square tests or logistic regression analyses. 4 studies treated the outcome as a “count” outcome variable (2 studies applied a Poisson regression, 1 a negative binomial regression and 1 a zero-inflated binomial regression).

43% compared more than two groups. Median (IQR) sample size was 351 (range 163–608). 30% had one reader, 57% two readers, and 2% more than two; in 10% the number of readers was not recorded. Order of reading was random in 43%, sequential in 31%, and unknown in 26%. Most applied the Sharp van der Heijde scoring method (75%); 9% the Genant modification, and 16% other methods.

Conclusions: There is large heterogeneity in the analysis strategy of radiographic progression in recent RA clinical trials and observational studies: a large number of studies apply simple, suboptimal or inappropriate methods. In addition, key information (i.e. number of readers and order of readings) is poorly documented.

Disclosure of Interest: S. Mahmood: None declared, L. van Tuyl: None declared, L. Schoonmade: None declared, R. Landewé Employee of: director of Rheumatology Consultancy BV, D. van der Heijde Employee of: director of Rheumatology Consultancy BV, J. Twisk: None declared, M. Boers: None declared

DOI: 10.1136/annrheumdis-2017-eular.1829

THU0704 EVALUATION OF THE ACCURACY OF HAND AND FOOT MRI IN THE EARLY IDENTIFICATION OF RA: USING THE PREVALENCE OF LOW-GRADED INFLAMMATION IN THE SYMPTOM-FREE POPULATION AS REFERENCE REDUCES FALSE-POSITIVE MRI RESULTS

A.C. Boer¹, L.E. Burgers¹, L. Mangnus¹, R.M. Ten Brinck¹, W.P. Nieuwenhuis¹, H.W. Van Steenbergen¹, M. Reijnders², T.W. Huizinga¹, A.H. van der Helm van Mil¹. ¹Rheumatology; ²Radiology, LUMC, Leiden, Netherlands

Background: Early identification of rheumatoid arthritis (RA) is important, because it allows early treatment initiation and is associated with better disease outcomes. In this perspective, the use of hand and foot MRI in the diagnostic process of rheumatoid arthritis (RA) has been advocated. Recent studies showed that MRI is helpful in predicting progression from clinically suspect arthralgia (CSA) to clinical arthritis, and from undifferentiated arthritis (UA) to RA. However, the diagnostic value of MRI is still undetermined. Most studies focussed on the sensitivity rather than the specificity of inflammation detected on MRI. It is known that symptom-free persons can also show inflammation on MRI. Consequently, it has been questioned if MRI-findings in symptom-free volunteers are relevant to consider as a reference when defining a “positive MRI”.

Objectives: To determine the value of considering MRI-findings in a control group for the predictive accuracy of MRI when defining a positive MRI.

Methods: 225 patients with CSA and 201 patients with UA underwent MRI of MCP-, wrist- and MTP-joints at baseline and were followed for 1 year on progression to arthritis and RA respectively. MRI was considered positive either if ≥1 joint showed inflammation (called “uncorrected definition”), or if ≥1 joint had inflammation that was present in <5% of persons of the same age-category at the same location in a symptom free reference population (called “5% corrected definition”). MRI scans were scored according to RAMRIS method. Test characteristics were compared for both definitions, hence with and without the incorporation of a reference population when defining a “positive MRI”.

Results: By using MRI-data of symptom-free volunteers as reference, the